

ACKNOWLEDGEMENTS

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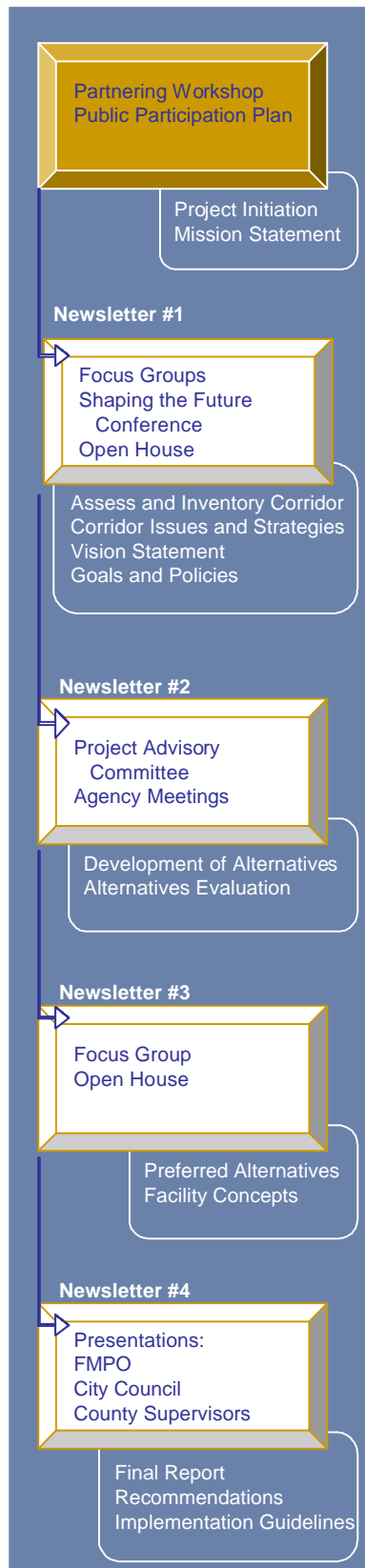
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1. STUDY PROCESS AND ORGANIZATION



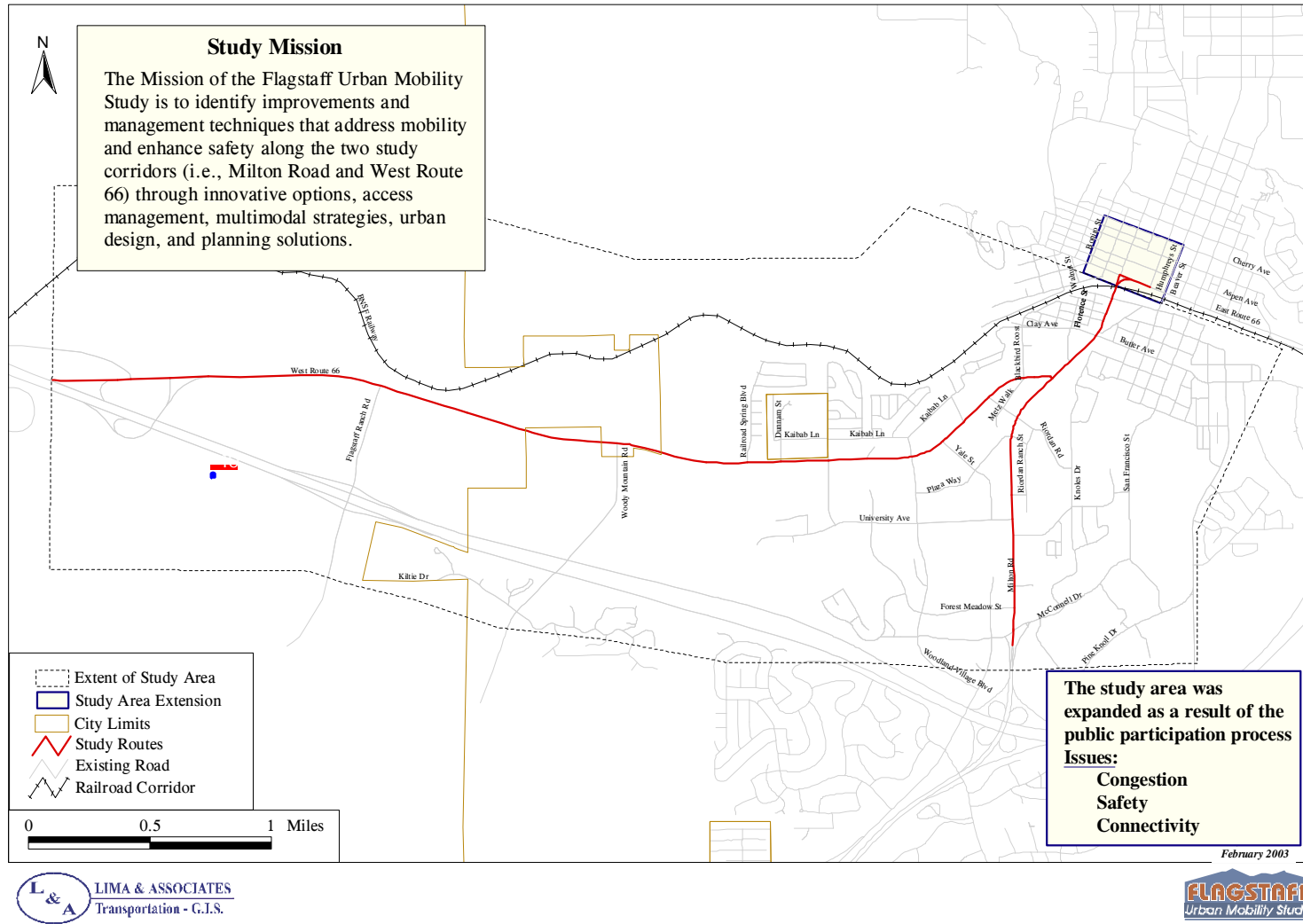
The Flagstaff Urban Mobility Study (FUMS) was an innovative partnership of federal, state, regional, and local stakeholders designed to seek context sensitive mobility solutions for two vital corridors within the Flagstaff region. These mobility solutions were defined, evaluated, and refined through a citizens' driven integrated public involvement and technical process. This report documents the process, describes the study findings, and presents the study recommendations.

The overall study organization, process, and mission are described in this chapter. An assessment of the existing conditions and the major corridor issues is presented in the next chapter. The chapter describes how the integrated public involvement process generated the major issues and potential solutions that became the foundation for developing and evaluating mobility options. Chapter 3 first presents the visions for the two study corridors that were defined through the public participation process and then presents the primary goals and policies that the Project Advisory Committee (PAC) developed. The fourth chapter describes the alternative mobility packages that were defined based upon the issues, vision, and goals. Findings of the evaluation of the alternative mobility packages are presented in Chapter 5. Chapter 6 presents a detailed analysis of downtown improvement options. Multimodal recommendations for the two study corridors are presented in the seventh chapter and implementation strategies are presented in the final chapter. Each step of the process was documented in more detail in a series of working and discussion papers that are presented in the references section. Comments from the PAC on the Draft Final Report are included in the Appendix. The reader who is interested in obtaining more detailed information than is presented here should contact the Flagstaff Metropolitan Planning Organization (FMPO).

STUDY BACKGROUND

The study focused on the corridors shown in the attached Figure 1: 1) Milton Road from I-17 to the Burlington Northern San Francisco (BNSF) Railroad Bridge and East Route 66 from the BNSF Railroad Bridge to Humphreys Street; and 2) West Route 66 from Milton Road to the I-40 interchange. The

FIGURE 1. STUDY AREA



corridors are approximately one mile on each side of Milton Road/East Route 66 and West Route 66. Milton Road (SR 89A), East Route 66, and West Route 66 are state routes that serve as major thoroughfares within an urban area or transition from a rural area to an urban area. The routes serve long distance vehicle trips as well as local trips. Land uses within the corridor include single and multifamily residential, commercial, office, and university uses. The land use along Milton Road (SR 89A) and portions of West Route 66 are

primarily commercial including shopping centers, motels, restaurants, and service stations. Mobility within the corridors is restricted due to an insufficient urban transportation network and, as a result, a large number of trips are made on the state routes. As expected, congestion and safety become major issues along state routes. Also, since the state routes are forced to carry high traffic volumes they present barriers between adjacent land uses as well as to other modes of transportation, such as transit, bicycling, and pedestrians. The existing commercial land use along the state routes is also not conducive to the transit, pedestrian, and bicycle modes. In addition, connectivity of all the transportation modes needs to be improved within the corridors to enhance mobility.

REGIONAL LAND USE AND TRANSPORTATION PLAN STRATEGIES

- ◇ *Coordinate plan policies with ADOT and FHWA.*
- ◇ *Identify and adopt multimodal corridors throughout the region for priority investments.*
- ◇ *Develop transportation facility design and updated roadway cross-section guidelines.*
- ◇ *Develop an area-wide access management system.*
- ◇ *Identify trail, bicycle, and pedestrian projects and programs in the Transportation Improvement Plan.*
- ◇ *Implement Regional Land Use Plan policies that encourage a variety of transportation modes.*

The adopted Flagstaff Regional Land Use and Transportation Plan (RLTP) recommends various strategies to meet the goal of a safe, convenient, user-friendly transportation system which included alternative transportation modes. This study applied the strategies developed by the adopted RLTP for improving mobility and safety within the two study corridors.

Extension of the Milton Road Corridor

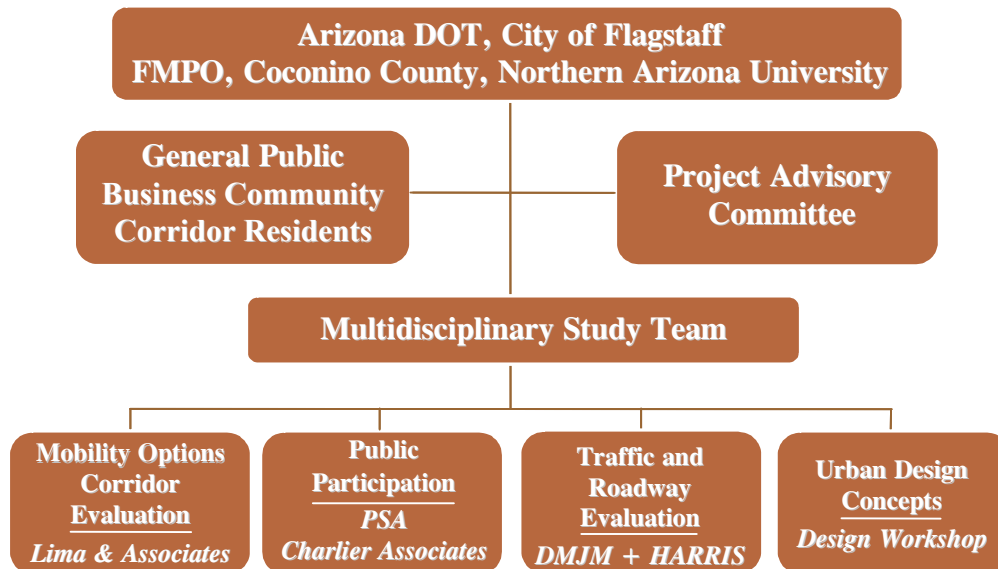
One early result of the public participation process was the revision of the northern limit of the Milton Road Corridor. The original Work Plan for the FUMS included the Milton Road Corridor from I-17 to the Burlington Northern Santa Fe Railroad Bridge. However, comments from the FMPO Executive Board, Flagstaff City Council, and the Coconino County Board of Supervisors strongly suggested that the corridor should be extended beyond the BNSF Railroad Bridge to address the bottleneck situation between the bridge and Humphreys Street. Similar comments were also made at the first Focus Group meetings that are described later in the next chapter. The primary reason for extending the corridor limit to the north was the fact the traffic congestion on Milton Road extends north beyond the BNSF bridge and that the bottleneck condition between the bridge and Humphreys Street (US 180) is intertwined with the traffic operations south of the bridge.

Based on the comments, discussions were held with the City of Flagstaff and Arizona Department of Transportation (ADOT) District to explore expanding the Milton Road Corridor on East Route 66 to the northern terminus of the corridor to Humphreys Street (also a state route known as US 180). A revised scope of work was then prepared to extend the northern terminus and submitted to ADOT and was approved. The study area was adjusted to include a portion of the downtown area bounded on the west by Sitgreaves Street, on the north by Cherry Avenue, on the east by Beaver Street, and on the south by the BNSF railroad.

STUDY PARTNERSHIP AND PROCESS

Figure 2 illustrates the organization of the study. The FUMS was conducted in partnership with the Arizona Department of Transportation, Flagstaff Metropolitan Planning Organization (FMPO), City of Flagstaff, Coconino County, Northern Arizona University, and other stakeholders. A Project Advisory Committee composed of individuals from ADOT, NACOG, Northern Arizona University (NAU), City of Flagstaff, FTA, Coconino County, and FHWA, guided the overall process of the study. An interdisciplinary Consultant Team led by Lima & Associates conducted the study. The Consultant Team shown in Figure 2 included professional staff in transportation planning and corridor evaluation, land use planning, urban design, traffic analysis and operations, roadway design, and public involvement.

FIGURE 2. STUDY ORGANIZATION



Study Process

The study process shown in Figure 3 was an integrated public participation and technical process designed to reach agreement on general mobility and land use concepts. The public participation process was conducted as an open, cooperative, and participative process for developing vision and concepts. A detailed work plan was the first task in the study process.

FIGURE 3. INTEGRATED TECHNICAL AND PUBLIC PARTICIPATION PROCESS



prepared in cooperation with the PAC to guide the overall process. The final work plan included a specific study Mission Statement. A draft Public Participation Plan was also prepared outlining specific participation activities including Focus Groups, Shaping the Future Conference, and Community Open Houses. Both the *Detailed Work Plan* and *Public Participation Plan* were presented to the Flagstaff Metropolitan Planning Organization (FMPO) Executive Board. After approval of both plans by the Executive Board, the plans were presented to the Flagstaff City Council and Coconino County Board of Supervisors for discussion and comment.

Based on the input from the public participation process, transportation issues and regional mobility options were identified and evaluated. Existing transportation, traffic, and safety characteristics of both study corridors were inventoried and evaluated. Alternative transportation and land use scenarios were then identified and screened, using input from the PAC, Focus Groups, Future Search Conference, and Community Open Houses. A final set of transportation/land use alternatives was further refined and evaluated in more detail. Another series of Focus Groups was used to refine the recommendations which were presented at the final Community Open House. The recommended mobility facility concepts were refined and documented in the draft final report. Implementation guidelines were prepared for intergovernmental coordination, access management, and land use regulations. The draft final

report will be presented to the Flagstaff Metropolitan Planning Organization (FMPO) Executive Board, Flagstaff City Council, and Coconino Board of Supervisors.

STUDY MISSION AND OBJECTIVES

At the onset of the study, a draft detailed work plan and a public participation plan were prepared by the consultant team. A partnering session with the Project Advisory Committee (PAC) was then facilitated by PSA to:

- Reach agreement on a Mission Statement
- Define study objectives
- Understand public participation plan and work plan
- Understand roles of Project Advisory Committee and Consultant Team

Mission Statement/Objectives

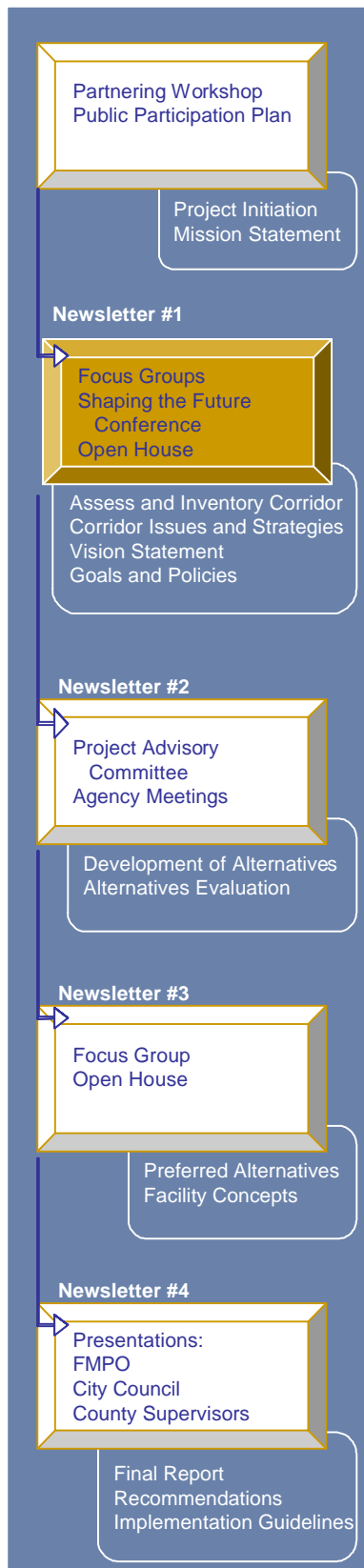
The following Mission Statement was developed in coordination with the Project Advisory Committee (PAC):

The Mission of the Flagstaff Urban Mobility Study is to identify improvements and management techniques that address mobility and enhance safety along the two study corridors, Milton Road and West Route 66, through innovative options, access management, multimodal strategies, urban design, and planning solutions.

Project Objectives

- Develop feasible capital projects that will be implemented due to widespread community and political acceptance.
- Create ordinances, regulations and/or policies that ensure improvements can be implemented.
- Create an access management program that works for all roadway types.
- Strengthen partnerships with the coalition agencies (i.e., city, county, NAU, ADOT, FMPO, NACOG) and create a common vision for the corridors.
- Develop a program of improvements and projects that can be implemented incrementally.
- Develop a program and process that can be transferable to other communities statewide.

2. ASSESSMENT OF EXISTING CONDITIONS AND MAJOR ISSUES



This chapter discusses the assessment of the existing corridor conditions and the identification of the major issues and potential solutions. The assessment of the existing conditions included: current plans and programs, land use, street and transit conditions, trails/pedestrian/bicycle facilities conditions, traffic conditions, and crash analysis.

FINDINGS OF CORRIDOR ASSESSMENT

The following presents the major findings from the assessment of the existing corridor conditions.

Land Use

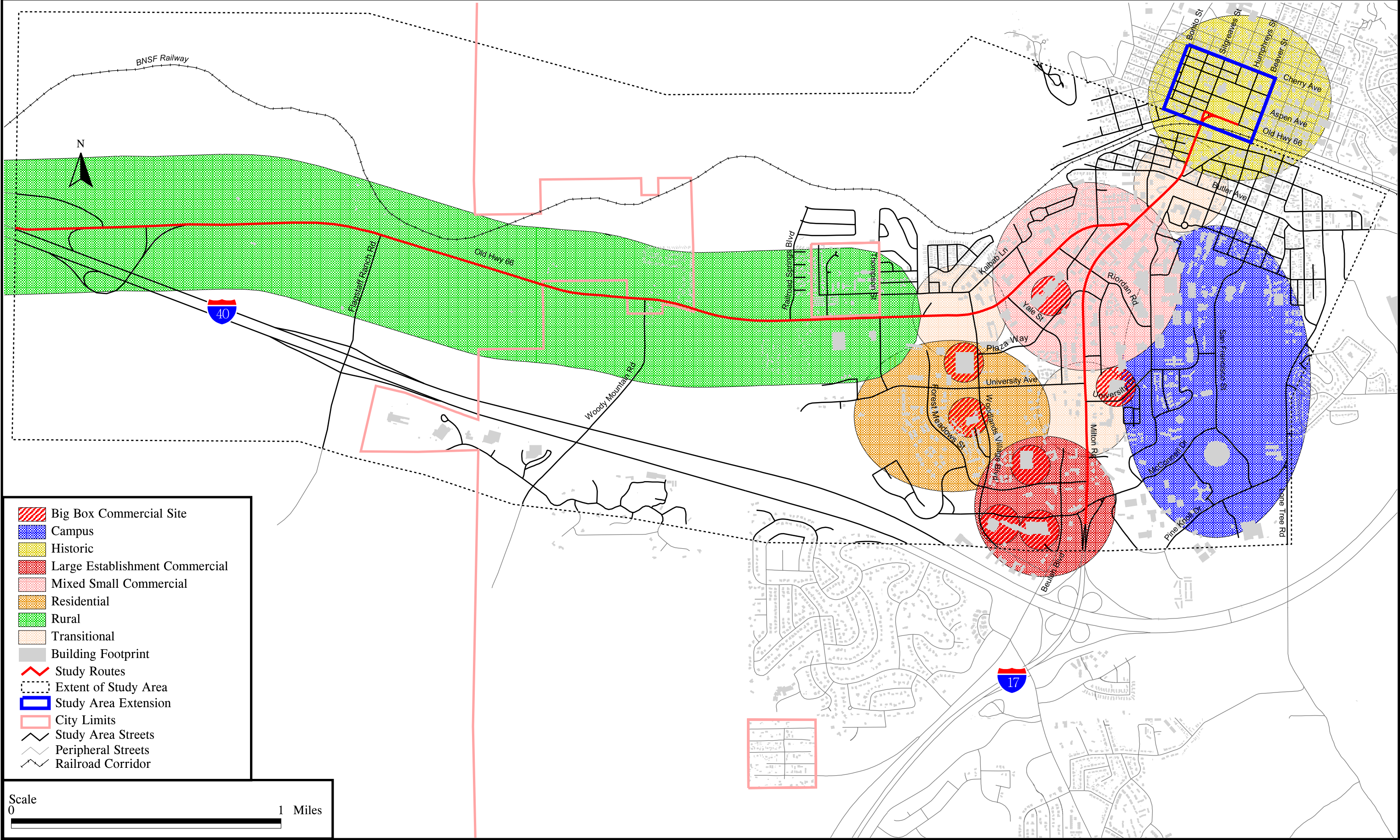
An extensive analysis was conducted on the demographics and land use conditions within the study corridors including:

- Existing land use
- Schools, historic districts, and redevelopment areas
- Parks and protected open space
- Rio de Flag project, streams, and floodplains
- Undeveloped parcels
- Building footprints and businesses
- Identification of character areas within the corridors

The land use findings are presented below:

- Land uses within the limits of the study corridor embody single and multifamily residential, commercial, office, and university uses. Figure 4 illustrates the existing land use character areas within the corridor.
- A more detailed analysis found that Milton Road and portions of West Route 66 are primarily commercial, including shopping, motels, restaurants, and service stations.
- Currently, commercial uses along the state routes are not conducive to transit, pedestrians, or bicyclists.

FIGURE 4. CHARACTER AREAS



- Moving west and south from the tightly woven fabric of Downtown, the land use fabric becomes more open. Building footprints become larger and the spaces between the footprints increase in size. As a result, walking distances increase between destinations.
- The various land use categories were classified into six distinct character areas: 1) Large Establishment Commercial, 2) Historic, 3) Mixed Small Commercial, 4) Transitional, 5) Rural, and 6) Residential/Campus. These character areas indicate a clear conceptual organization of the study corridors.

Street Conditions

Street Conditions within the corridor were also assessed. The overall function and characteristics of the corridor street system was described and illustrated including interstates, state routes, and major streets such as Butler Avenue, Woodlands Village Boulevard, and Humphreys Street. The connectivity and continuity of the street systems was also evaluated. The findings are summarized below:

- The current street hierarchy includes only a few arterials – Milton Road, West Route 66, and East Route 66, which are all state routes. The remaining streets are lower level collectors and local roads; therefore, street capacity is limited.
- Only limited sections of roadways provide service parallel to the state routes.
- The street system within the corridor lacks continuity. The state routes of Milton Road, West Route 66, and East Route 66 are the only continuous roadways through the corridors.
- The street system does not adequately connect activities within the corridor. Gaps in street segments exist and discontinuities exist such as intersections that are offset from one another.
- Milton Road, West Route 66, and East Route 66 corridors are major centers of economic, employment, administrative, and residential activity in Flagstaff and for Coconino County. The functioning of the corridors is of great importance to the economy of the city as well as the region.
- Milton Road and East Route 66 are classified as major arterials. These routes provide high capacity for longer trips; direct access to major regional centers of activity; roadway continuity for regional, interregional and interstate trips; and the connection of the Flagstaff region to surrounding regions.
- West Route 66 from the intersection with Milton westward is classified as a minor arterial providing capacity and continuity for travel between different districts of the region.
- Intersections are spaced too close together along Milton Road and portions of Route 66. Many driveways access the roadways.

- The Burlington Northern Santa Fe Rail Road underpass distinctively divides the southern and northern part of the city as well as the corridors themselves. The narrow underpass is also a bottleneck between the southern and northern parts of the City.
- Congestion and safety are problems on the heavily traveled portions of the state routes with traffic volumes up to 53,000 vehicles a day.
- The traffic on the state routes discourage other modes of transportation such as transit, bicycling, and walking.

Transit Conditions

Transit Conditions within the corridors were inventoried including the Mountain Line Transit System, Mountain Campus Transit, and services provided by Coconino County Council on Aging. A map was prepared illustrating the transit routes. The transit conditions finding are presented as follows:

- Existing public transit service is limited within the study corridors.
- Transit service on West Route 66 exists only to Woodlands Village Boulevard, leaving the remainder of the corridor without service.
- Milton Road is not covered continuously by a transit route.
- No bus pullouts or bus shelters exist along Milton Road.
- Northern Arizona University provides service on campus and service to Woodlands Village apartments.
- Coconino County Council on Aging provides transportation services to the elderly, mentally and physically challenged, and low-income persons.

Trails/Pedestrian/Bicycle Facilities Conditions

Other facilities that were inventoried included trails, pedestrian facilities, and bicycle facilities. The Flagstaff Urban Trails System (FUTS), an important system of off-street pathways, was reviewed. The system of bicycle lanes/routes is intended to complement the urban trail system and consists of on-street bike lanes and off-street multiuse paths. Pedestrian facilities of the urban trails consist mainly of sidewalks directly adjacent to the roadway. The following are the findings of the assessment:

- The existing urban trails, pedestrian facilities, and bicycle facilities are not continuous within the study corridors and do not adequately connect activities.
- Pedestrian facilities along the state routes are limited to sidewalks directly adjacent to the roadways. In some areas the sidewalks are narrow and outdated.

- Due to the lack of dedicated bicycle lanes or paths, pedestrians often share the sidewalk with bicyclists.
- Currently, no buffering exists between the sidewalks and the roadway.
- The many driveways located along the corridors are potential crash locations for automobiles, transit, bicycles, and pedestrians.
- The opportunities to cross the routes are often limited, and many pedestrians, therefore, cross the road mid-block using the center left-turn lane as refuge.

Traffic Conditions

An extensive assessment of existing traffic conditions was conducted. Daily and peak period traffic counts were collected along Milton Road, East Route 66, and West Route 66. Turning movement counts were collected at 13 intersections, both signalized and unsignalized, for the morning, mid-day, and evening peak periods. Both intersection and arterial levels of service were computed for the three peak-periods. Levels of service are defined by letter designations from A to F, with LOS A representing the best operating conditions with the lowest delay, and LOS F the worst conditions. The existing traffic operations on the two study routes were simulated using the Synchro and SimTraffic software. A summary of findings for the traffic conditions is listed below:

- US Route 180 and Beaver Street between East Route 66 operate at LOS F during all three peak hours.
- Speeds along US Route 180 and Beaver Street between East Route 66 and Aspen range from 3.9 to 4.8 miles per hour during the PM peak hour.
- The level of service of certain individual traffic movements (through or turn movements) operate at unacceptable levels of service, LOS E or worse, such as at the East Route 66/Humphreys Street intersection.
- The intersection of Milton Road/Butler operates at LOS E during the Mid-Day peak hour.
- The critical movements at the unsignalized intersections are generally operating at unacceptable levels of service, meaning that vehicles trying to make a left or right turn onto Milton Road or Highway 66 are experiencing very long delays.
- The arterial analyses indicates that Milton Road is operating at acceptable levels of service during all three peak hour periods, with the exception of the segment between the West Route 66 and Butler intersections that operates at LOS F during the PM peak hour.

- Speeds along Milton Road are slow, ranging from 7.7 miles per hour to 24.4 miles per hour during the PM peak hour.
- The results of the intersection capacity analyses indicate that most of the signalized intersections within the corridor are operating at overall acceptable levels of service D or better, in the AM, Mid-Day, and PM peak hours.
- West Route 66 is operating at acceptable levels of service during all three-peak hour periods.
- 2001 daily traffic volumes ranged from approximately 32,000 to 41,000 vehicles per day on Milton Road/East Route 66 and from approximately 4,500 to 22,000 vehicles per day on West Route 66 (see Figure 5).

Crash Analysis

A comprehensive analysis of the historical crashes on the state routes was conducted, which included:

- Number of vehicle crashes illustrated along the state routes
- Summary of the damage severity, crash type
- Summaries of the intersection crashes and crash rates
- Summary of the segment crash rates
- Predominant violation types by segment
- Pedestrian and bicycle crashes illustrated along the state routes
- Driveway crashes illustrated along the state routes

A summary of findings is as follows:

- The five intersections with the highest number of crashes (more than 10 per year) are:
 - West Route 66 and Butler Avenue
 - East Route 66 and Humphreys Street
 - Milton Road and Forest Meadows Street
 - East Route 66 and Beaver Street
 - Milton Road and University Drive
- Roadway segments with the highest crash rates are:
 - West Route 66: Woodlands Village Boulevard to Yale Street
 - West Route 66: Yale Street to Riordan Road
 - West Route 66: Butler Avenue to Tucson Avenue
 - Milton Road: University Drive to University Avenue
 - Milton Road: South Plaza Way to West Route 66
- A total of 1,153 crashes occurred along the study route in the three-year period from December 1997 to December 2000 (see Figure 6).

FIGURE 5. 2001 DAILY TRAFFIC VOLUMES

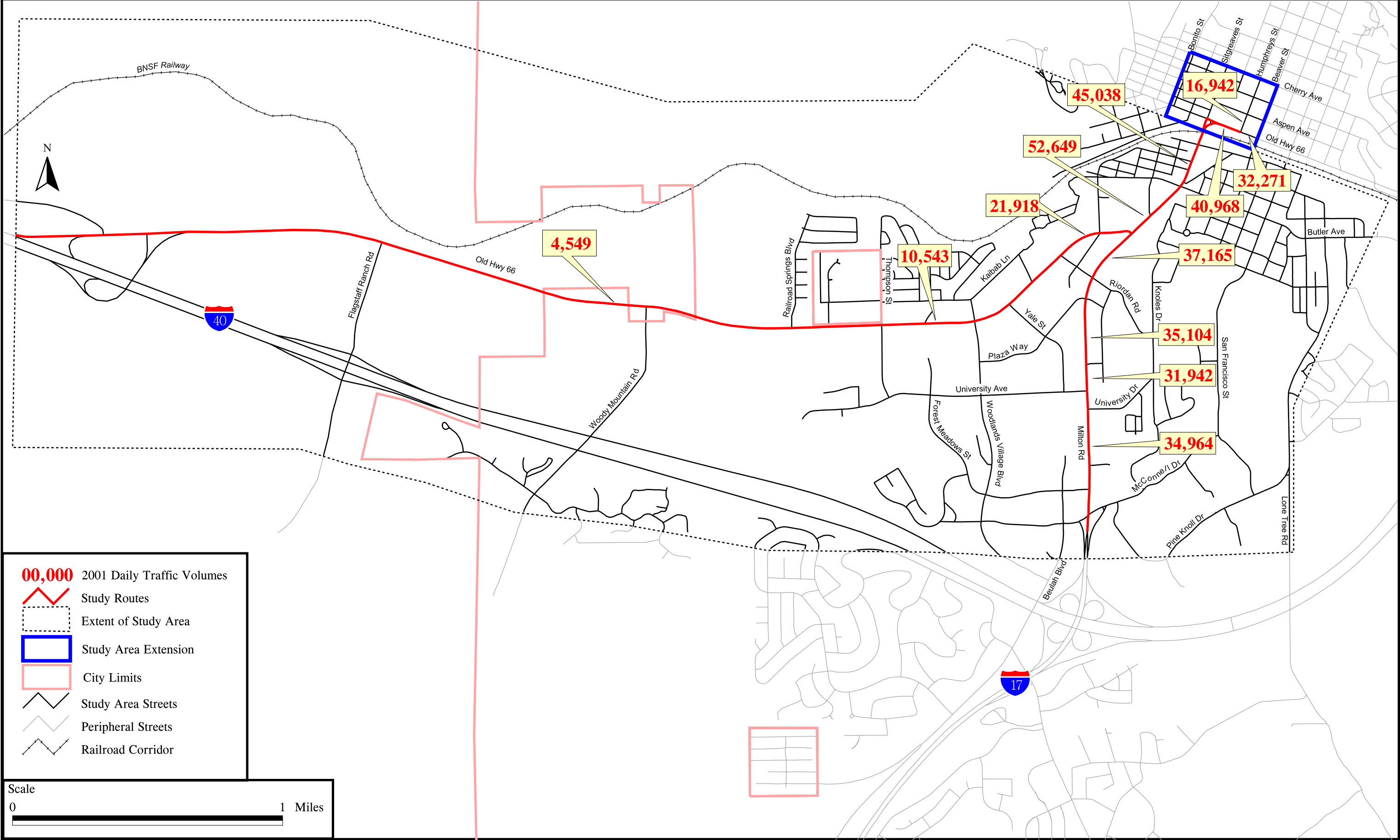
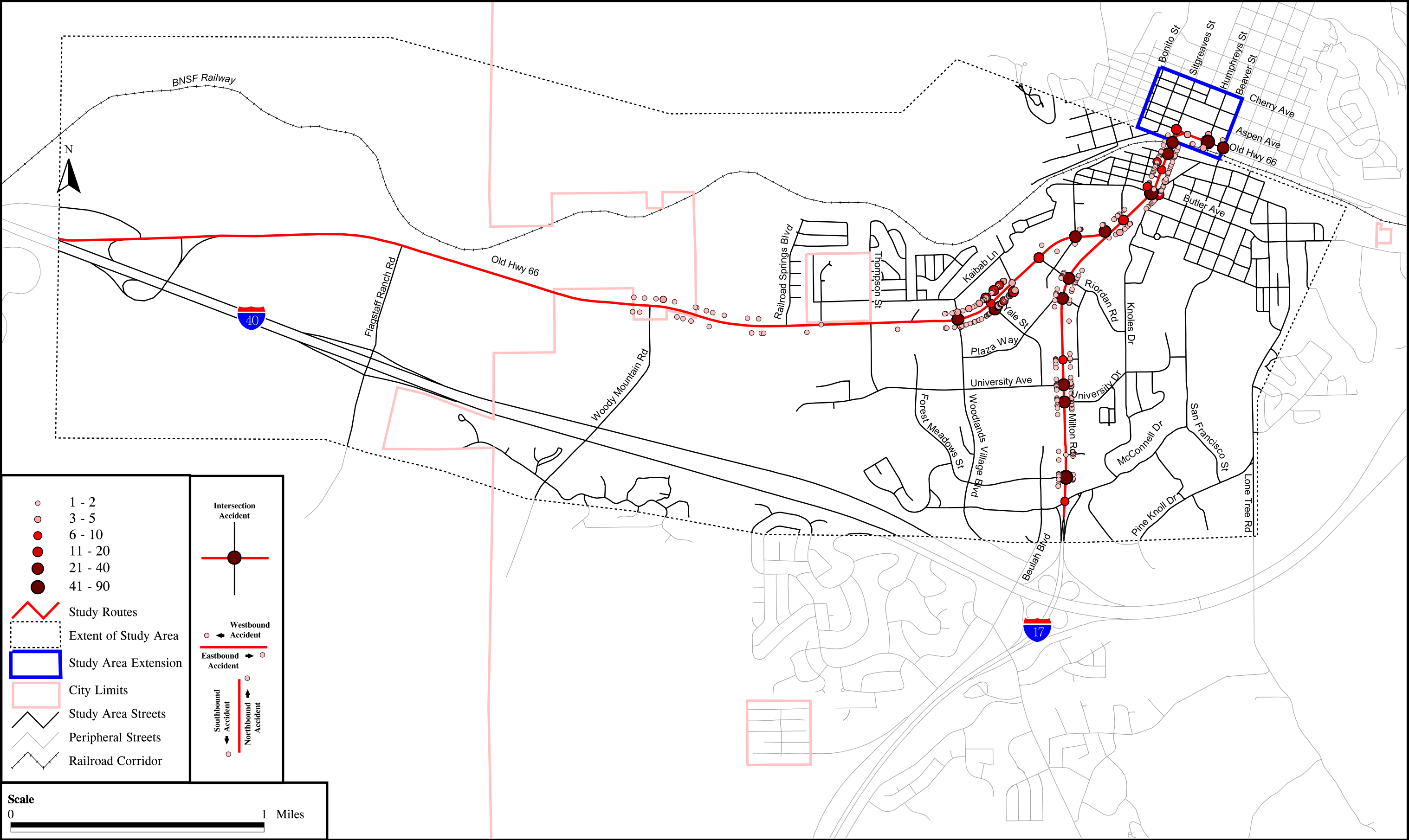


FIGURE 6. NUMBER OF TOTAL CRASHES (DECEMBER 1997 - DECEMBER 2000)



- Of the 1,153 crashes from the three year period, 51 percent were intersection related, 10 percent driveway related, and the remainder unrelated to either intersections or driveways. Figure 7 illustrates driveway crashes.
- Of the 1,153 crashes, 15 percent were possible injury, 8 percent non-incapacitating injury, 1 percent incapacitating injury. One fatal crash occurred during this period.
- Ninety percent of the crashes were collisions with other motor vehicles, followed by collisions with a fixed object (4%), and crashes involving bicyclists (3%), and pedestrians (1%). Figure 8 illustrates pedestrian and bicyclist crashes.
- The analysis of historical crashes indicates that the segment of Milton Road/East Route 66 between Butler Avenue and Humphreys Street experience a high number of crashes. A more detailed analysis of the crashes on this segment is presented in *Chapter 6. Analysis of Downtown Options*.

ASSESSMENT OF CORRIDOR ISSUES

The corridor issues were identified by the public through the first series of public participation activities including Focus Groups, Shaping the Future Conference, and Public Open House.

Focus Groups

The purpose of the Focus Groups was to solicit thoughts and opinions about mobility issues and potential solutions. Two series of three Focus Groups were held during the process. The groups were comprised of residents, agency representations, and business representatives. The first series of Focus Groups held on April 6, 2001, consisted of three separate groups composed of residents (16 residents), agencies (23 representatives), and businesses (6 representatives). The Focus Group participants were asked to identify key mobility issues within the two study corridors. These issues were also placed on a map of the corridors. The results, conclusions, and recommendations of the first Focus Group meetings were summarized in the report *Flagstaff Urban Mobility Study, Focus Group Report (First Round)*, April 6, 2001.

The second series of Focus Groups was held on February 26 and 27, 2003 to discuss draft recommendations. The Consultant Team facilitated the three-hour discussions and then analyzed the results. The results, conclusions, and recommendations of the second series Focus Group meetings were summarized in the report *Flagstaff Urban Mobility Study. Focus Group Report (Second Round), February 26, 2003*.

Shaping the Future Conference

The large public meeting of the public involvement process was a full day Shaping the Future Conference held on May 4, 2001. Approximately 100 people attended the conference. The

FIGURE 7. DRIVEWAY CRASHES (DECEMBER 1997 - DECEMBER 2000)

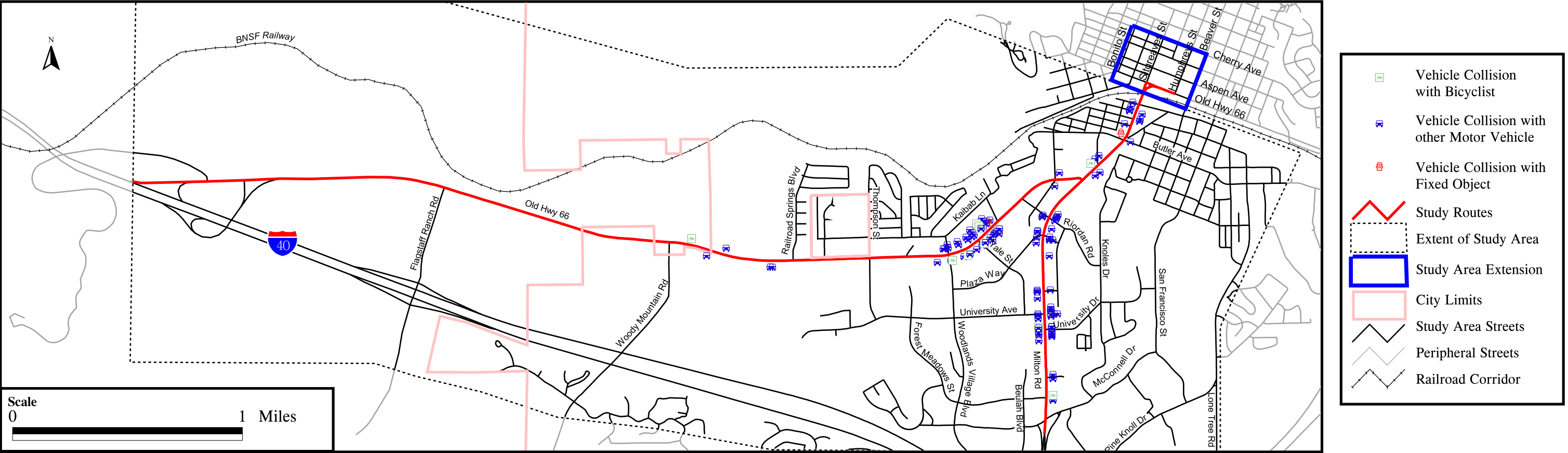
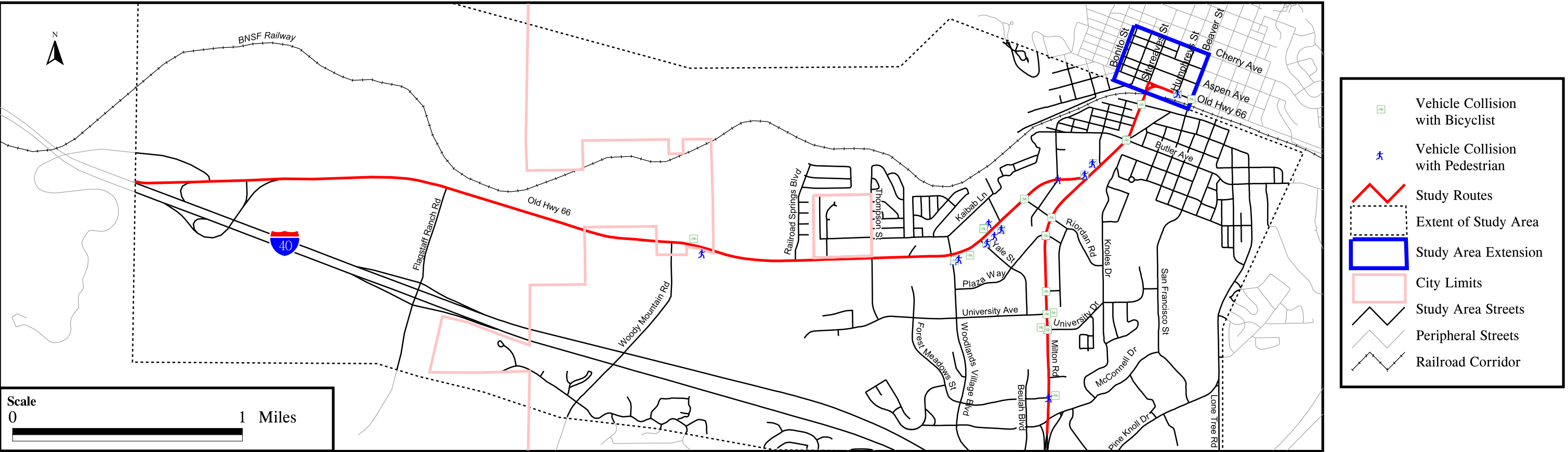


FIGURE 8. PEDESTRIAN AND BICYCLIST CRASHES (DECEMBER 1997 - DECEMBER 2000)



ultimate goal of the Conference was to search for common ground among the attendees on how land use and the corridors develop, and how mobility issues were to be addressed. The Conference was an opportunity to communicate, educate, empower, partner, and build consensus with the public on issues that impact the development of the FUMS and ultimately the future of the City of Flagstaff.

The conference explored the region's mobility history, discussed ideal and probable futures, examined trends and issues, and identified potential solutions. Display boards provided the results of the corridor assessment as background for the participants. The morning sessions presented a historical background of the corridors, a panel discussion was held on the roles of the corridors, and conference attendees completed a visual preference survey. During the late morning and afternoon, attendees were divided into smaller groups to develop the vision for the corridors, define corridor principles, and to map potential solutions. The results and conclusions of the conference are summarized in the Milton Road and West Route 66, Shaping the Future Conference: Summary Report, May 4, 2001.

Community Open Houses

Community Open Houses provide an opportunity for the public to learn about the study's progress and provide input to the process. An Open House provides an opportunity for the public to speak informally with the Consultant Team and agency officials about issues, concerns, or other aspects of the study. The first Open House held on July 12, 2002 was structured with a series of stations where participants could view and comment on various aspects of the project's process. Forty-five people attended the event. The consultant team members were available to answer questions and document comments. Display boards at the various stations presented existing conditions, issues, and potential improvement options. Participants received a questionnaire when they arrived and had an opportunity to view the exhibits concerning major issues, existing conditions, and potential improvement options. Based on what the participants viewed, they were asked to review some possible solutions and to identify how favorable they were. The results, recommendations, and conclusions from the first Open House are documented in the report *Flagstaff Urban Mobility Study, Community Open House: Summary Report*, July 12, 2001.

ANALYSIS OF THE ISSUES AND POTENTIAL SOLUTIONS

The identification of the issues and potential solutions was driven by the public participation process described above. In addition, the responses of the public indicated the relative importance of the issues and potential solutions, and revealed areas of agreement or disagreement.

The participants of the Focus Groups as well as the participants of the Shaping the Future Conference produced maps of issues and potential solutions for the two study corridors. Figures 9 and 10 illustrate the final issues and potential solutions maps that were defined by the public participation process.

FIGURE 9. ISSUES MAP
ISSUES IDENTIFIED THROUGH PUBLIC PARTICIPATION PROCESS

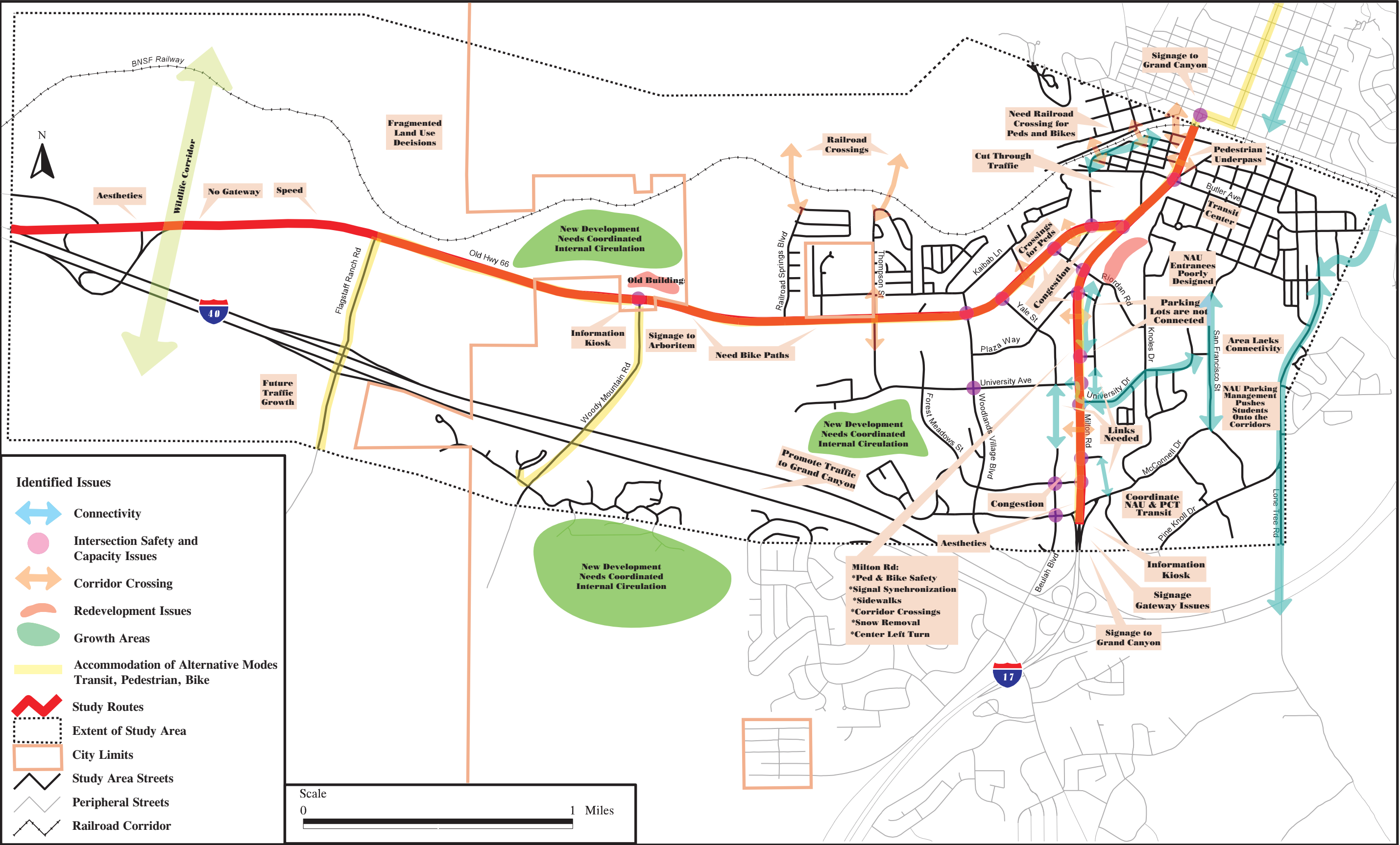
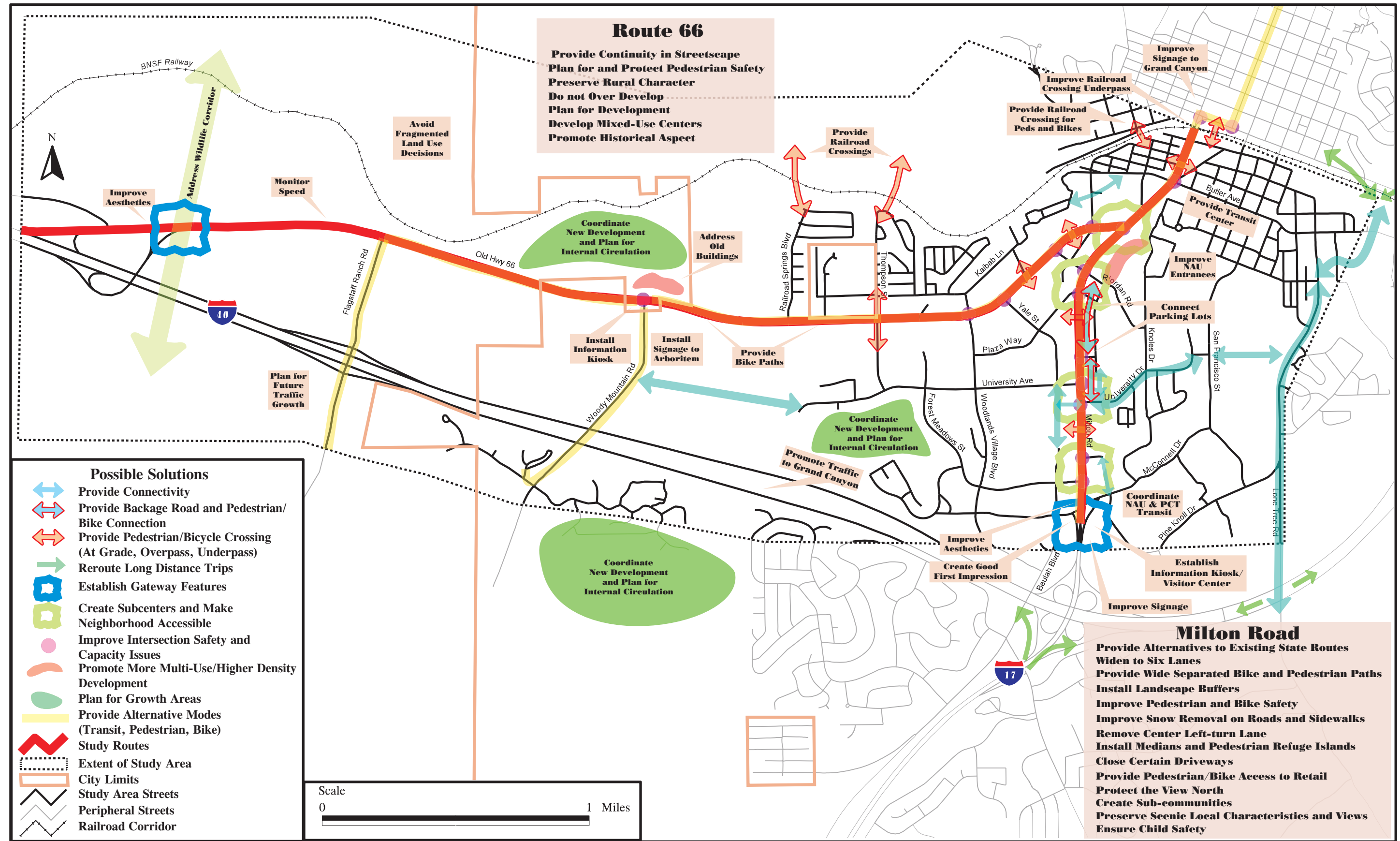


FIGURE 10. SOLUTIONS MAP
POSSIBLE SOLUTIONS IDENTIFIED THROUGH PUBLIC PARTICIPATION PROCESS



The analysis of the corridor issues and potential solutions support the following findings:

Critical Issues

The Flagstaff public feels that the improvement options for the two study corridors should address the following issues:

- Traffic Congestion
- Pedestrian and Bicycle Circulation
- Public Safety
- Community Character
- Transit

Favorable Solutions

The top ten solutions favored at the Shaping the Future Conference were (not listed in order):

- Closure of Driveways
- Installation of Setback Sidewalks
- Construction of Bike Lanes or Paths
- Construction of Pedestrian/Bike Under or Overpass(es)
- Connect Parking Lots of Commercial Uses
- Provide Landscaping
- Improve Signal Synchronization
- Linkage of Land Uses Across the Corridor
- Provide Alternative Routes
- Improve Signage

The top ten potential solutions at the Open House were (not listed in order):

- Provide for (Pedestrian) Corridor Crossings; At-Grade, Over/Underpass
- Protect the Environment
- Improve Signal Timing and Prioritization
- Improve Pedestrian Access and Circulation
- Integrate Path System with the FUTS
- Preserve Visual Appearance and Aesthetics
- Improve Transit Access and Circulation
- Plan for Future Development
- Provide Safe Access to Schools
- Preserve Dark Skies

Unfavorable Solutions

The following potential solutions attracted opposition from attendees at the Shaping the Future Conference:

1. Don't Do Anything (95%)
2. Increase Capacity, Number of Lanes (55%)

The following potential solutions attracted opposition from Open House attendees:

1. Don't Do Anything (96%)
2. Widen Roadways (52%)

Areas of Agreement

The attendees of the Public Open House voted on potential solutions were in strong agreement on several potential solutions:

- Preserve Character of Neighborhoods
- Preserve Visual Appearance and Aesthetics
- Protect the Environment
- Improve Signal Timing and Prioritization
- Provide Safe Access to Schools
- Improve Pedestrian Access and Circulation
- Improve Transit Access and Circulation
- Preserve Dark Skies
- Integrate Pedestrian System with the Flagstaff Urban Trails System
- Linkage of Land Uses Across the Corridor
- Provide for Pedestrian Corridor Crossings; At-Grade, Over/Underpass

Potential Areas of Conflict

Actions and policies that are potentially polarizing among the Open House attendees:

- Reduce Street Width
- Redirect Traffic (i.e., to Grand Canyon)
- Lower Speed Limit
- Widen Roadways
- Remove Center Left-Turn Lane
- Provide On-Street Bike Lanes
- Install Medians

- Provide Frontage Roads
- Close Certain Driveways
- Provide Alternatives to Existing State Routes
- Encourage Mixed-Use Development Patterns

As demonstrated later in the discussion of the second series of public involvement, the Study Team was successful over the course of the study in reaching agreement on some of the areas of conflict.

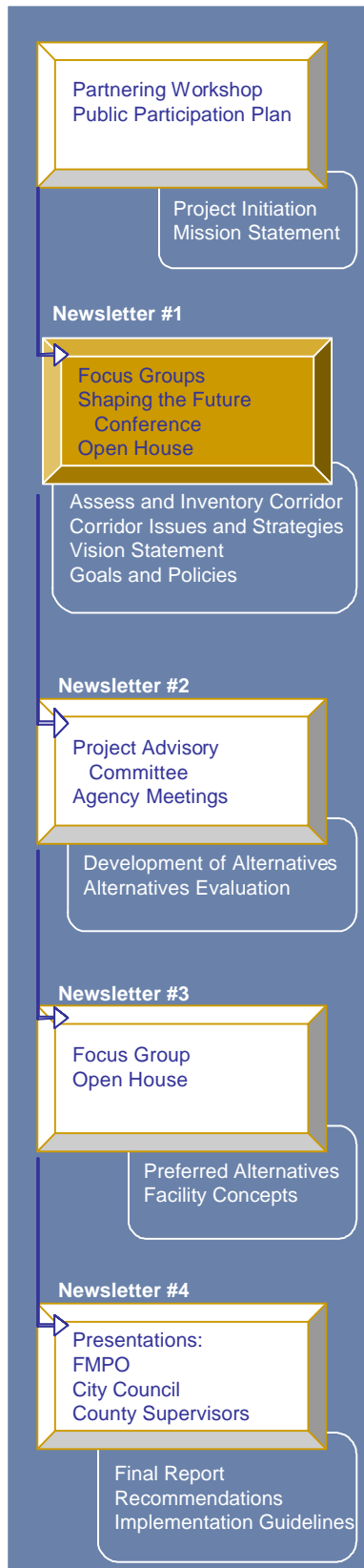
Relationship between Issues and Solutions

The issues were grouped into six categories: Traffic Congestion, Pedestrian and Bicycles, Community Character and Visual Aesthetics, Public Safety, Environment, and Public Transit Service. Based upon the professional judgment of the Consultant Team, the following potential solutions address more than four of the six categories of issues (Table 1). For example, the solution of improving signal synchronization helps improve traffic congestion, public safety, environment, and public transit service.

TABLE 1. RELATIONSHIP BETWEEN ISSUES AND SOLUTIONS

Potential Solution	Traffic Congestion	Pedestrian/Bicycles	Public Safety	Community Character	Environment	Public Transit
Closure of Driveways	X	X	X	X		X
Improve Signal Synchronization	X		X		X	X
Provide Alternative Routes	X	X	X	X		X
Improve Signage	X	X	X	X		X
Installation of Medians	X	X	X	X		
Improvement of Transit	X	X		X	X	X
Redevelopment of Commercial Uses	X	X	X	X		
Redirection of Traffic Traveling to the Grand Canyon	X	X	X		X	

3. CORRIDOR VISION, GOALS, AND POLICIES



The vision statements for the two study corridors were developed from statements made during the public participation process. Similarly, corridor principles were prepared defining how the corridors should develop in support of the corridor visions. Based on the corridor visions and principles, the PAC developed goals and policies to guide the future development of the corridors.

VISION– MILTON ROAD/EAST ROUTE 66

The Milton Road/East Route 66 corridor is an important gateway to the City of Flagstaff from I-17 and will be aesthetically designed within its urban setting. The corridor provides safe and efficient travel for interstate, regional, and local vehicle traffic. In addition, the corridor is a critical connection of concentrated residential, commercial, and university activities. The land use along the corridor will be designed to minimize automobile trips and to support the pedestrian, bicycle, and transit modes. Multimodal transportation facilities will safely and efficiently connect land use activities within the corridor to move pedestrians, bicyclists, and transit vehicles safely and efficiently both along and across the corridor.

VISION – US WEST ROUTE 66

The West 66 corridor is an important gateway to the City of Flagstaff from I-40. The corridor will maintain its rural character to the west and gradually transition to urban character toward Milton Road. The corridor will be aesthetically designed to accommodate its rural nature. The corridor provides safe and efficient travel for interstate, regional, and local vehicle traffic. In addition, the corridor is a critical connection to residential, commercial, and university activities. The land use along the corridor will be designed to minimize automobile trips and to support the pedestrian, bicycle, and transit modes. Multimodal transportation facilities will safely and efficiently connect land use activities within the corridor to move pedestrians, bicyclists, and transit vehicles safely and efficiently both along and across the corridor.

CORRIDOR PRINCIPLES

The following principles developed through the public participation process support the respective visions for Milton Road/East Route 66 and West Route 66.

- Provide aesthetic gateways into the City of Flagstaff that clearly define the character of the area.
- Provide aesthetically pleasing transportation facilities along and within the corridor.
- Provide safe and efficient vehicle flow on the State Routes and within the corridors.
- Reduce vehicle travel in the corridors and increase travel on alternative modes.
- Connect the land uses within the corridors with parallel multimodal facilities.
- Provide multimodal transportation facilities that safely and efficiently cross the corridors linking residential, commercial, and university activities.
- Provide alternative transportation modes including pedestrian, bicycle, and transit facilities along the State Routes and within the corridors.
- Manage the corridors so they perform safe and efficiently through the application of techniques such as access management.
- Provide multimodal transportation facilities that safely and efficiently connect the residential, commercial, and university activities within the corridors.
- Reorient the land use along Milton Road and the urban portions of West Route 66 toward mixed higher-density commercial land use along the Routes.
- Preserve the rural character of West Route 66 by providing lower density development in the rural portions of the corridor.

GOALS AND POLICIES

Given the vision for each of the two study corridors and corridor principles, the following goals and policies were prepared in coordination with the PAC to guide the development and management of the study corridors.

Goal 1: System Integration

To maintain and improve the safe and efficient movement of people and goods, to contribute to the health of Flagstaff's and Coconino County's local and regional economies, and to enhance livability as well as to support Arizona's statewide transportation system.

Policy 1.1: Provide A Seamless Transportation System

The FUMS Partners will create an increasingly seamless transportation system with respect to the development, operation, and maintenance of the highway and road system that:

- ❑ safeguards the State Highway System by recognition of functionality and integrity
- ❑ ensures that local mobility and accessibility needs are addressed
- ❑ enhances system efficiency and safety

Policy 1.2: Partnerships

Cooperative partnerships will be established to make more efficient and effective use of the limited resources to develop, operate, and maintain the highway and street system. These partnerships are relationships among ADOT, Federal Highway Administration (FHWA), Federal Transit Administration (FTA), other state and federal agencies, FMPO, City of Flagstaff, Coconino County, tribal governments, and the private sector.

Policy 1.3: Organizational Enhancements

FUMS partners and other stakeholders will take a more active role for corridor improvements through the formation of a Corridor Management Team, to provide ongoing services, manage capital improvement projects, or raise funds to implement improvements.

Policy 1.4: Intergovernmental Working Group

An Intergovernmental Working Group will be formed among the FUMS partners to resolve conflict, get recommendations supported by elected officials, write joint funding policies, and implement Intergovernmental Agreements.

Policy 1.5: Functional Highway Classification System

The FMPO will apply and update the regional highway classification system to develop improvement guidelines and set priorities for system investment and management.

Policy 1.6: Coordination, Consultation, and Cooperation

In the spirit of coordination, consultation, and cooperation the FUMS Partners will work together to:

- ❑ provide safe and efficient roads for livability and economic viability for all citizens
- ❑ share responsibility for the highway corridors
- ❑ work collaboratively in planning and decision-making relating to transportation system management
- ❑ institutionalize the joint management of the corridors

Additionally, the FUMS Partners will coordinate land use and transportation decisions to efficiently use public infrastructure investments to:

- ❑ maintain the mobility and safety of the highway and street systems
- ❑ foster compact development patterns in the corridors
- ❑ encourage the availability and use of transportation alternatives
- ❑ enhance livability and economic competitiveness
- ❑ support acknowledged state, regional, city, and county transportation system plans

Policy 1.7: Interjurisdictional Transfers

The FUMS Partners will consider mutually beneficial interjurisdictional transfers that:

- ❑ rationalize and simplify the management responsibilities along a particular roadway segment or corridor
- ❑ reflect the appropriate functional classification of a particular roadway segment or corridor
- ❑ lead to increased efficiencies in the operation and maintenance of a particular roadway segment or corridor

Goal 2: System Investment

Policy 2.1: Improvement Priorities

ADOT will maintain highway performance and enhance safety by improving system efficiency and management before adding capacity to the State Highways. ADOT will work in partnership with regional and local governments to address highway performance and safety needs.

Policy 2.2: Improve Corridor Performance

FUMS Partners will cooperatively work on improving vehicle traffic on the state routes as well as throughout the corridors by evaluating the need to:

- ❑ increase street capacity
- ❑ increase intersection capacity
- ❑ add additional lanes
- ❑ construct grade separations
- ❑ improve intersections
- ❑ distribute traffic among other facilities
- ❑ provide continuity in travel

Additionally the FUMS Partners will use traffic control measures and maintenance to enhance the efficiency of the corridors through such measures as:

- ❑ improved signal timing
- ❑ traffic flow improvements
- ❑ redirection of traffic

Policy 2.3: Off-system Improvements

ADOT will consider assistance to local jurisdictions to develop, enhance, and maintain improvements of local transportation systems if they are a cost-effective way to improve the operation of the State Highway System. ADOT will support such projects through mechanisms such as enhancement grants if the project is mutually beneficial and if:

- ❑ The off-system costs are less than or equal to on-system costs, and/or benefits to the state system are equal to or greater than those achieved by investing in on-system improvements
- ❑ Local jurisdictions adopt land use, access management, and other policies and ordinances to assure the continued benefit of the off-system improvement to the State Highway System
- ❑ Local jurisdictions agree to provide advance notice to ADOT of any land use decisions that may impact the off-system improvement in such a way as to adversely impact the State Highway System
- ❑ Local jurisdictions agree to a minimum maintenance level for the off-system improvement that will assure the continued benefit of the off-system improvement of the State Highway System

Goal 3: System Management

The FUMS Partners will continuously improve and support the efficient management of the transportation system to improve the functioning of the corridors in a cost-effective manner.

Policy 3.1: Transportation Demand Management

The FUMS Partners will support the efficient use of the state and local transportation system through investment in transportation demand management such as:

- ❑ the broad range implementation of Intelligent Transportation Systems services to improve system efficiency and safety in a cost-effective manner
- ❑ the cost-effective expansion of the highway and street system's passenger capacity through feasibility analysis, development and use of park-and-ride facilities
- ❑ the encouragement of staggered work and class hours

- ❑ the establishment and support of a rideshare program
- ❑ the establishment of a parking management system
- ❑ the redirection of long-distance trips around the corridors

Goal 4: Traffic Safety

The FUMS Partners will continuously improve safety for all users of the highway system using solutions involving engineering, education, enforcement, and emergency medical services.

Policy 4.1: Improve Safety throughout the Corridor

The FUMS Partners will improve safety in the corridors and will make funding available for:

- ❑ addressing identified accident locations
- ❑ improving safe pedestrian and bicycle crossings in the corridor
- ❑ implementing and enhancing the Safe to School program
- ❑ implementing a comprehensive access management plan that will reduce accidents in the corridor and improve safety
- ❑ increase safety and transportation efficiently through the reduction and prevention of conflicts between railroad and highway users
- ❑ incident management and emergency services

Goal 5: Access Management

The FUMS Partners will employ access management strategies to ensure safe and efficient streets and highways consistent with their determined function, ensure the statewide movement of goods and services, enhance community livability and support planned development patterns, while recognizing the needs of motor vehicles, transit, pedestrians, and bicyclists.

Policy 5.1: Recognition of Property Rights

The FUMS Partners recognize that every owner of property, which abuts a State Highway, has the right to reasonable access but does not have the right of unregulated access.

Policy 5.2: Implementation of Access Management

The FUMS Partners will cooperatively develop and implement a comprehensive access management plan to preserve and maintain the safety, capacity, and mobility of the State's Highway system and link the communities, businesses, and neighborhoods it serves in order to:

- ❑ preserve the functional integrity of the corridor highways and streets
- ❑ reduce the vehicle crash rate and increase the safety of the corridor highways and streets

Policy 5.3: Develop and Implement Guidelines and Standards

The FUMS Partners will establish an access management team to cooperatively develop guidelines and standards, and to define and regulate access to the corridor highways and streets. Additionally, ADOT will adequately support, and provide resources for, the permitting process and the enforcement of access management.

Policy 5.4: Purchase Access Control

The FUMS Partners will cooperatively use the purchase of access rights, when feasible, to implement access management.

Policy 5.5: Recognize the Interdependency of Land Use and Transportation for Access Management

The FUMS Partners recognize that land use and transportation are mutually dependent and that successful access management requires the linkage of land use and transportation decisions.

Policy 5.6: Support Access Management Through Public Outreach

The FUMS Partners will cooperatively support the implementation of access management through outreach, public participation, and educational processes.

Policy 5.7: Provide Funding for Access Management

The FUMS Partners will cooperatively strive to ensure that capital and operational funding is available for access management efforts.

Goal 6: Travel Alternatives

To optimize the overall efficiency and utility of the corridor street network through the use of alternative modes and multimodal travel demand management strategies.

Policy 6.1: Highway Freight System

The need for movement of goods will be balanced with other uses of the highway system, and to recognize the importance of maintaining efficient through movement on major truck freight routes.

Policy 6.2: Alternative Modes

The FUMS Partners will advance and support alternative transportation systems where travel demand, land use, and other factors indicate the potential for successful and effective development of alternative modes. This will include:

- ❑ transit operational facilities
- ❑ transit capital improvements
- ❑ capital improvements for pedestrian and bicycle modes
- ❑ education/outreach

Policy 6.3: Encourage Walking and Bicycling

The FUMS Partners will address pedestrian/bicycle issues through comprehensive planning in order to:

- ❑ consider pedestrian/bicycle needs in all transportation facilities
- ❑ reinforce a sense of neighborhood and community with transportation designs that accommodate pedestrian/bicycle use
- ❑ provide a connected system of pedestrian/bicycle routes in urban areas
- ❑ enhance pedestrian/bicycle mobility and safety in rural areas
- ❑ encourage land use and transportation development that accommodates pedestrian/bicycle use
- ❑ provide pedestrian/bicycle facilities that complement local business activity and provide access for employees and customers
- ❑ make capital improvements that connect major activity centers such as NAU through a comprehensive continuous path system

Policy 6.4: Provide Accessibility

The FUMS Partners will enhance intermodal access for persons with impaired mobility and adhere to the Americans with Disabilities Act and Environmental Justice considerations.

Goal 7: Acknowledge The Interrelationship Of Land Use And Transportation

To acknowledge the mutual dependency of land use and transportation in the decision making process.

Policy 7.1: Establish Land Use – Transportation Linkage

The FUMS Partners recognize that land use and transportation are mutually dependent and that successful management of the corridors requires the linkage of land use and transportation decisions through:

- ❑ application of uniform site design standards addressing the transportation and land use linkage
- ❑ infill development and redevelopment to reduce the dependency on automobile traffic
- ❑ incentives to implement changes to the land use pattern in the corridor

Goal 8: Environmental And Scenic Resources

To protect and enhance the natural and built environment throughout the process of constructing, operating, and maintaining the State Highway System.

Policy 8.1: Protect The Environment

The FUMS Partners will design, construct, operate, and maintain the State and local Highway System in consideration of the built and natural environment, especially wildlife habitat and migration routes, sensitive habitats and others.

Policy 8.2: Scenic Resources

The FUMS Partners will implement scenic resource management as an integral part of the process of creating and maintaining the State and local Highway System. State and local agencies will use best management practices to protect and enhance scenic resources in all phases of highway project planning, development, construction, and maintenance.

Policy 8.3: Historic Preservation

The FUMS Partners recognize the importance of historic preservation in the study corridor and will use best management practices to protect and enhance historic resources, including roadway features, in all phases of highway project planning, development, construction, and maintenance.

Policy 8.4: Gateways

The FUMS Partners will provide aesthetic gateways into the City of Flagstaff that clearly define the character of the area and communicate a sense of place.

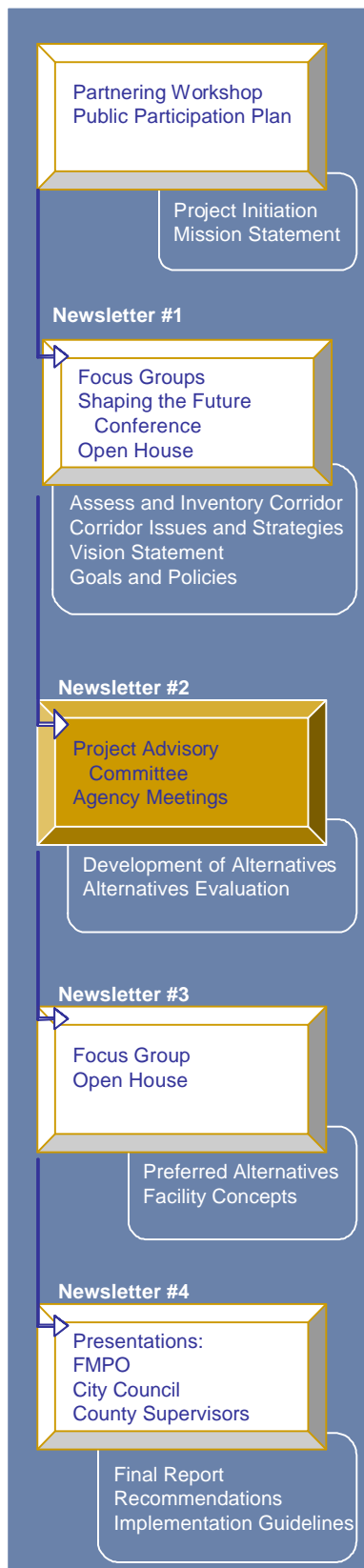
Goal 9: Public Involvement

To continuously inform and involve the public in all phases of corridor project planning, development, construction, and maintenance.

Policy 9.1: Public Participation

The FUMS Partners ensure that citizens, businesses, regional and local governments, state agencies, and tribal governments have opportunities to have input into decisions regarding proposed policies, plans, programs, and improvement projects that affect the State Highway System and corridor routes.

4. DEVELOPMENT OF ALTERNATIVE MOBILITY PACKAGES



This chapter describes the development of three alternative mobility packages that were developed to be evaluated for the study corridors. The development of the initial alternative packages was primarily based on the findings of the public participation efforts, the assessment of existing conditions, and a review of potential mobility strategies. Additional work was accomplished to identify goals and policies, guiding principles, and mobility concepts and strategies as the building blocks for the development of alternative packages. Each package is a combination of land use and multimodal strategies. The multimodal strategies represent various levels of modal shift from the automobile mode to alternative modes of transit, bicycling, and walking.

MOBILITY STRATEGIES

The Consultant Team worked with the PAC to develop three alternative mobility packages that incorporated various levels of mobility strategies to address the six issue categories of 1) traffic congestion, 2) pedestrians and bicycles, 3) community character and visual aesthetics, 4) public safety, 5) public transit service, and 6) and environment. The alternative mobility packages were constructed from a broad array of mobility strategies such as improving traffic flow and/or reducing travel demand. Extensive research was conducted to identify a wide range of possible strategies and measures with potential to improve mobility within the study corridors.

The strategies and measures were categorized by the following strategy groups:

- **Manage Growth and Redevelopment.** Strategies to manage growth and development can improve mobility through the regulation of development intensity, land use allocation, and site design requirements. Such regulations will encourage the reduction of trips and support alternative modes of transit, bicycling, and walking. Depending on the extent of the strategies such as growth boundaries, the strategies may not be politically acceptable. However, more moderate strategies, such as infill and redevelopment have the potential of being acceptable to the community and reducing travel demand.

- **Reduce Travel Demand.** A comprehensive package of travel demand strategies will reduce traffic at a low to moderate cost. These strategies could include carpooling, staggering work hours, and telecommuting.
- **Provide Additional Travel Opportunities through Alternative Modes.** Strategies that provide for alternative modes can shift traffic from automobiles to the pedestrian, bicycle, and transit modes. However, these strategies may require new construction and new services that require additional costs.
- **Improve Mobility by Managing Access.** Access management strategies such as raised medians and the elimination of driveways are effective in reducing congestion and are very effective in improving safety.
- **Traffic Control.** Strategies to improve mobility by traffic control have the potential to improve traffic flow and safety at low to moderate costs generally within existing right-of-way or with minimal physical impacts.
- **Distribute Traffic Among Other Facilities.** Strategies to distribute traffic to other facilities can shift traffic from one facility such as Milton Road to other improved or new facilities. However, these strategies could require additional construction, generating impacts on adjacent properties. Additional costs to improve existing facilities or construct new facilities would be required.
- **Manage the Transportation System.** Strategies to manage the system can potentially reduce traffic on the system. However, management strategies such as road pricing, tolls, and levying taxes would probably be politically infeasible. Other management strategies such as providing travel advisories would be acceptable.
- **Increase Street Capacity.** Strategies to increase capacity can improve vehicle speed and improve safety. However, strategies that increase capacity is costly, can impact right-of-way, and generate social impacts. Very large infrastructure projects to increase capacity such as super streets and grade-separated interchanges require high costs, have a large foot-print, and could generate social and business impacts.

No single strategy category will alleviate all the individual issues that have been identified by the public. A combination of strategies and individual measures will most effectively address the complex array of issues.

Each of the strategy groups is comprised of a set of strategy measures, which were ranked in regard to how well they would address key issues identified by the public as well as a series of “feasibility” criteria (see *Working Paper Mobility Strategies*). This initial evaluation and ranking of each of the measures was performed within each strategy group as shown in the following table.

TABLE 2. AVERAGE RANKING OF MOBILITY STRATEGY CATEGORIES

Mobility Strategy	Traffic Congestion	Community Character	Pedestrian and Bicyclists	Public Safety	Environment	Public Transit Service	Issue Score	Cost	Political Feasibility	Institutional Set-up	Feasibility Score	Total Score
Strategies that improve mobility by providing additional travel opportunities through alternative modes	0.7	0.2	2.4	1.2	0.8	1.3	6.7	1.7	2.5	-0.5	3.8	10.5
Strategies that improve mobility by managing access	1.7	1.4	1.9	2.6	0.8	1.4	9.9	0.2	-0.9	0.8	0.1	10.1
Strategies that improve vehicle flow by distributing traffic among other facilities	1.7	0.9	2.1	1.9	0.1	0.9	7.6	-0.2	0.7	1.6	2.2	9.8
Strategies that improve vehicle flow by traffic control/maintenance	1.1	0.1	0.2	1.2	0.7	0.8	4.2	0.6	1.8	2.5	4.9	9.0
Strategies that improve mobility by managing growth and redevelopment	1.2	2.0	2.0	0.5	1.2	2.0	9.0	1.0	-0.4	-1.9	-1.3	7.7
Strategies that reduce overall travel demand	1.4	0.2	0.3	0.0	1.0	1.1	4.0	2.4	1.6	-2.0	2.0	6.0
Strategies that improve mobility by managing the system	1.7	0.5	1.5	0.4	1.2	1.6	6.8	1.2	-1.3	-1.7	-1.8	5.0
Strategies that improve vehicle flow by increasing street capacity	2.2	-0.5	-0.5	1.5	0.2	0.6	3.6	-2.2	-0.5	2.8	0.2	3.8

ALTERNATIVE PACKAGE CONCEPTS

Each alternative package included land use and multimodal components that addressed the six issue categories (see Table 1). Table 3 summarizes the assumed levels of modal shift to alternative modes and the levels of access management for each package. Figures 11 through 13 illustrate the land use and roadway network for each package. The base condition, Package A, reflects the land use and roadway network of the adopted RLTP. However, Package A assumes a lower trip share for alternative modes than assumed in the adopted RLTP. Package A was also evaluated with and without access management. Package B, referred to as Light Capitalization, assumes that some areas within the study area are more nodal in nature having increased density at certain activity centers. In addition, Package B includes some additional street connections in the study corridors that are not in the adopted RLTP. Package B assume the same trip share for alternative modes assumed in Package A. Package C, referred as heavy capitalization includes significantly more transportation connections than the other two alternatives. In addition, Package C assumes a higher trip share for alternative modes than

TABLE 3. COMPONENTS ADDRESSED BY THE THREE PACKAGES

Issue	Package A	Package A No Access Management	Package B	Package C
Traffic Congestion	Intersection improvements; Some added corridor connectivity Some added regional connectivity Added capacity through widening in specific locations	Same components as A	+ refined network, additional connectivity, parallel facilities; additional bicycle and pedestrian facilities; grade separations for bicycles and pedestrians across the corridors	+ additional network connection within and outside the study corridor; capacity improvements on parallel routes. Improved or grade separated crossing of rail road tracks; Provision of east west routes crossing the corridor
Pedestrian and Bicycle Circulation	Implementation of FUTS, bicycle and pedestrian facilities	Same components as A	+ additional facilities; grade separated crossings	+ additional facilities parallel to improved facilities
Public Safety		Same components as A		
Community Character and Visual Aesthetics	Implementation of Design Review criteria	Same components as A	+ structured land use, mixed use, concentration of activities	+
Public Transit	Increase of service through planned and programmed transit enhancements	Same components as A	+ expanded transit services connecting nodes with each other as well as with other major regional destinations	+
Environment	Moderate noise and air quality impacts	Additional noise and air impacts	Improved air quality and less noise impacts	Improved air quality and less noise impacts
Assumptions				
Regionwide Modal Shift	4%	4%	4%	11%
Access Management	Mid level	No Access Management	Mid level	Full level
Mid level Access Management:		Full implementation of Access Management:		
<ul style="list-style-type: none"> four-lane divided Milton Road/East Route 66 and West Route 66 raised medians combine driveways (50% reduction as goal) possible elimination, relocation, or additional intersections goal of ¼ mile plus intersection spacing 		<ul style="list-style-type: none"> four-lane divided Milton Road/East Route 66 and West Route 66 raised medians no driveways from state route – access through backage roads in the area of nodes along Milton No new intersections – determine right-in/right out intersections Possible elimination and/or relocation of intersections ¼ mile intersection spacing, intermediate intersections right-in/right out only 		

FIGURE 11. ALTERNATIVE A 2020 LAND USE

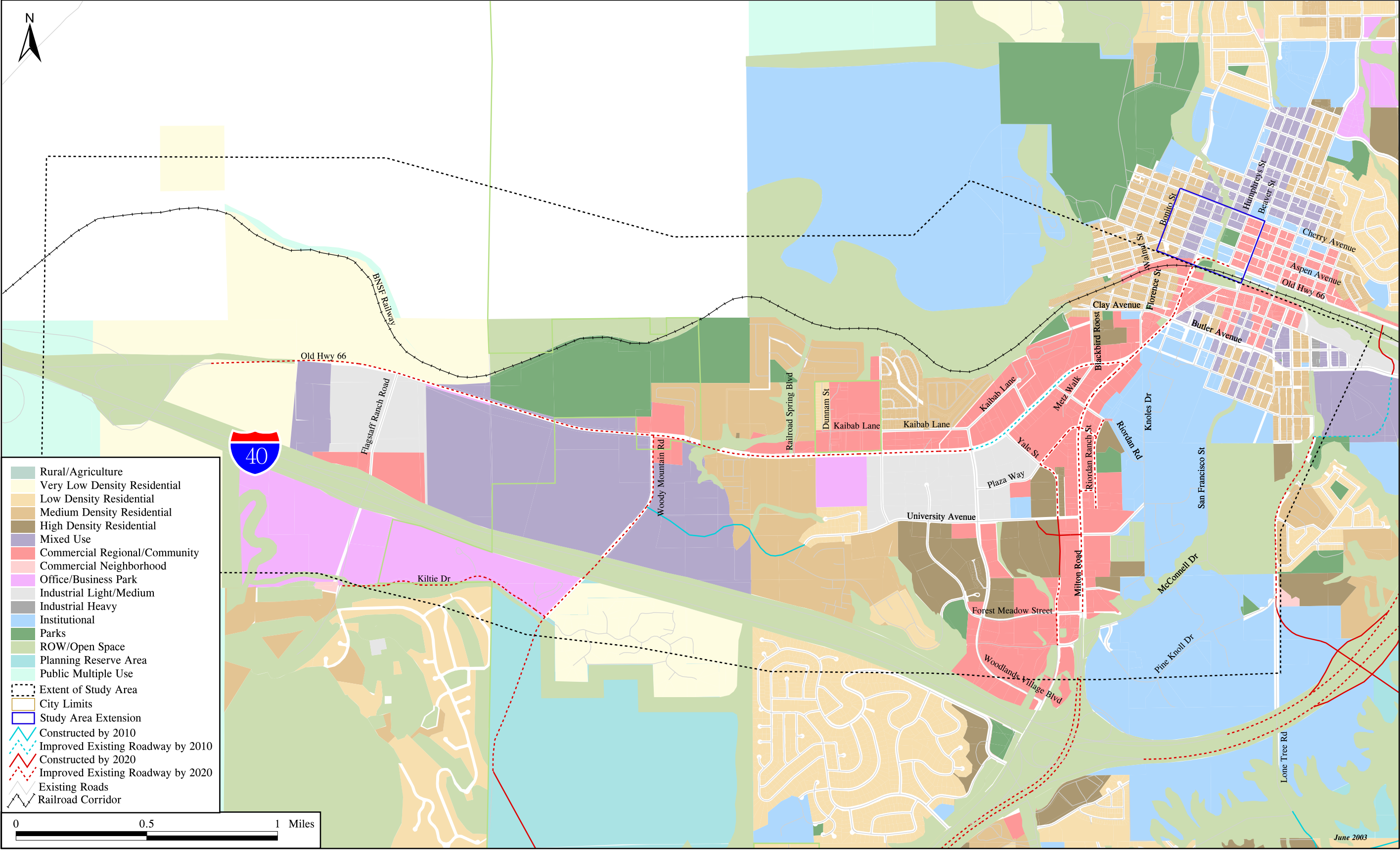


FIGURE 12. ALTERNATIVE B 2020 LAND USE

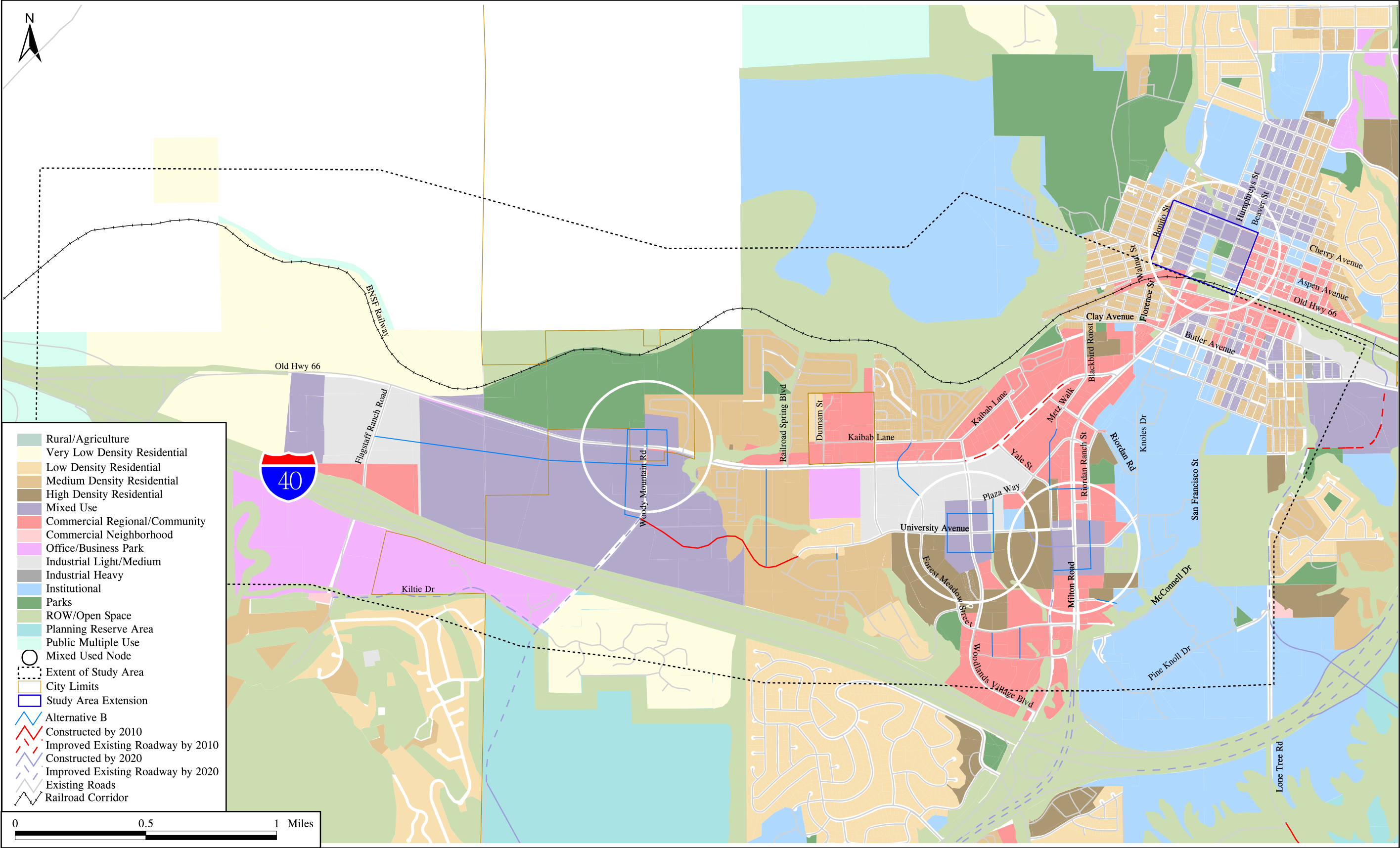
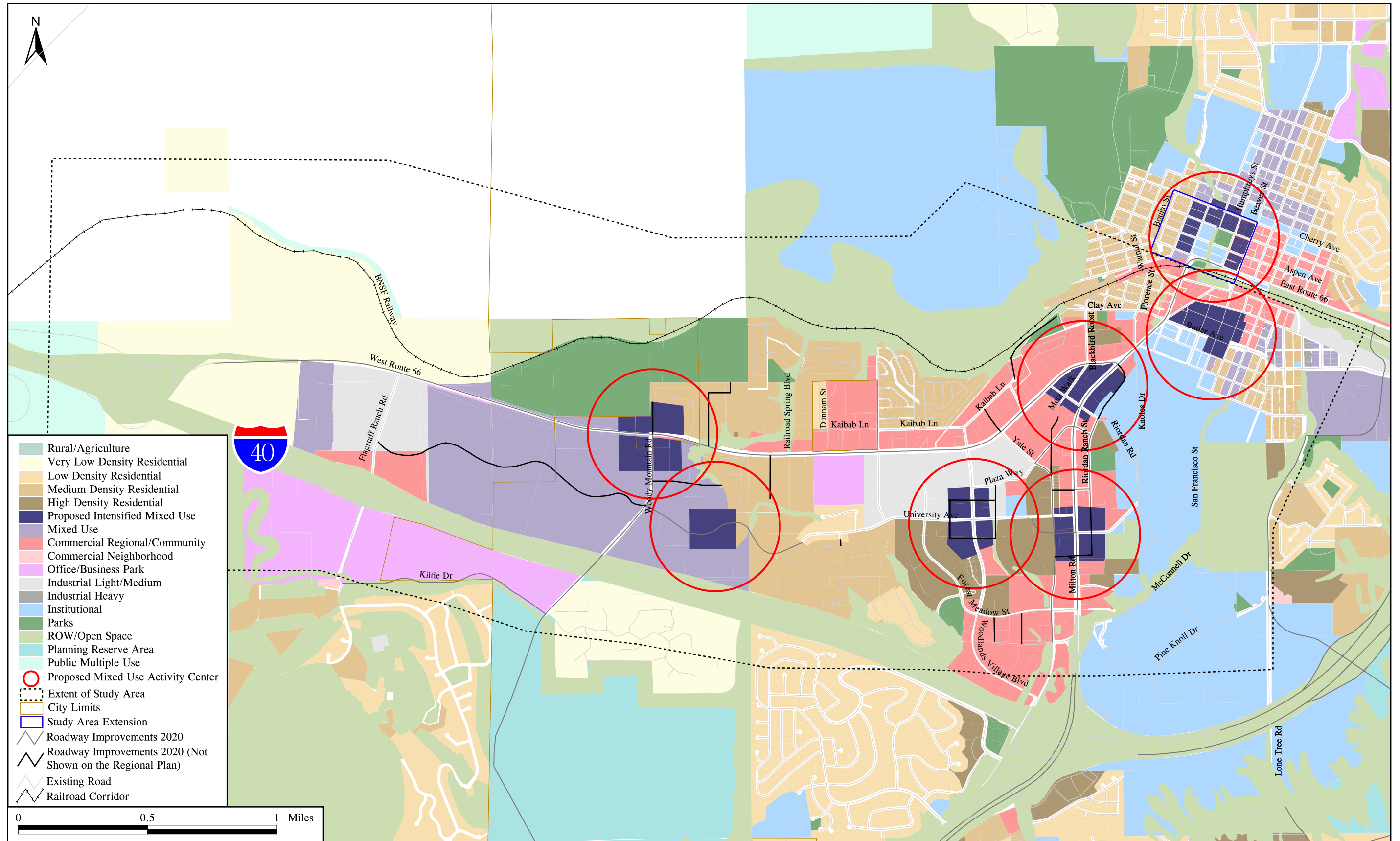


FIGURE 13. ALTERNATIVE C 2020 LAND USE



Packages A and B. The following outlines the alternative concepts in regard to land use and transportation, as well as brief an approach on how to test the alternatives.

Package A: The Base Condition

Land Use

Alternative Package A is the base condition representing the land use and 2020 transportation improvements in the approved Flagstaff Regional Land Use and Transportation Plan. Within the Study Area, the proposed land uses consist of:

- Low density strip commercial, hotel, and restaurant uses along Milton Road
- Concentrated mixed use commercial and government offices in the downtown area
- Low to mid density residential on south and north of West 66
- High density residential on West side of Milton Road
- NAU Campus uses east of Milton Road

Transportation

The transportation improvements in the adopted RLTP that have major impacts on the traffic in the study area include the following:

- Lone Tree/I-40 Interchange
- Widening of Lone Tree Road
- Lone Tree Bypass at East Route 66
- Realignment of University Avenue from the west to be in line with existing University Drive
- Extension of Beulah Boulevard to University Avenue
- Widening of portions of West Route 66 just west of Milton Road

Package A assumes a regionwide four percent reduction of vehicle trips due to increased share of pedestrian, bicycle, and transit trips. This modal shift is less than the 11 percent trip share for alternative modes assumed by the adopted RLTP. The existing roadway circulation through Northern Arizona University will remain. Package A has mid-level management control: four-lane divided roadway, raised medians, and a reduced number of driveways (50 percent reduction as a goal) with right-turn in and right-turn out movements.

Alternative B: Regional Plan Light Capitalization

Land Use

Alternatives B illustrate land use patterns similar to those patterns found in the adopted RLTP, but are more nodal in nature. These alternatives encourage growth, redevelopment and

urbanization within specific activity centers, promoting alternative modes of transportation and minimizing trips. Buildings within these nodes would be pushed forward, close to the right-of-way, minimizing gaps between structures, and developing an urban streetscape.

Each node consists of a “core” area and an “influence” area, and has a total dimension equal to a one-half mile radius. The core is a concentrated area of mixed-use development, approximately forty acres in size, at the center of each node. Land uses outside of the forty-acre areas, but within the one-half mile influence area, should follow the Design Review Guidelines (DRG), found in the City of Flagstaff’s Land Development Codes, encouraging pedestrian and multimodal movement. A reallocation of uses from adjacent areas will be necessary in both alternatives.

Alternative B emphasizes light capitalization. This alternative would be achieved through passive redevelopment and application of the Design Review Guidelines. Mixed-use community activity centers are located at the following locations:

- Downtown area
- The intersection of Milton Road and University Drive
- The intersection of Woodlands Village Boulevard and University Avenue
- The intersection of Woody Mountain Road and West Route 66

Transportation

Alternative Package B includes the regional includes arterial and collector network as Alternative A. However, the concept emphasizes automobile access from “backage roads”, a system of facilities parallel to Milton Road with some new intersections. The facilities parallel to Milton Road form a more extensive backpage road system than in Alternative Package A. On the east side, Riordan Ranch Street extends south connecting Chambers Drive with University Drive, and to the new east-west collector between Saunders Drive and University Drive. On the west side of Milton Road, Beulah Boulevard extends north connecting Metz Walk to West Route 66 at Blackbird Roost. Additional intersections are also located along Milton Road between Forest Meadows and University Drive and also between Chambers Drive and Plaza Way.

Pedestrian and bicycle facilities in Package B are largely as planned in the adopted RLTP, with the assumption of additional pedestrian and bicycle facilities provided through site design requirements in the DRG that encourage alternative modes. Similar to Package A, Package B assumes a regionwide four percent reduction of vehicle trips due to increased share of pedestrian, bicycle, and transit trips. This modal shift is less than the 11 percent trip share for alternative modes assumed by the adopted RLTP. The existing roadway circulation through Northern Arizona University will remain. Package B also has mid-level management control: four-lane divided roadway, raised medians, and a reduced number of driveways (50 percent reduction as a goal) with right-turn in and right-turn out movements.

Alternative C: Regional Plan Heavy Capitalization

Land Use

Alternative C consists of land use patterns similar to those patterns found in Alternative B, but with greater intensification of the land uses within the forty-acre mixed-use centers. One additional mixed-use community activity center is shown in this alternative (located at Route 66 and Milton Road), as well as a mixed-use neighborhood activity center (located east of Woody Mountain Road and South of Route 66). Intensification of uses within the mixed-use centers will occur through an increase in Floor Area Ratios (F.A.R.) and building heights, as well as through a reduction in parking requirements. This alternative assumes aggressive city redevelopment strategies. The locations of the nodes for this alternative are as follows:

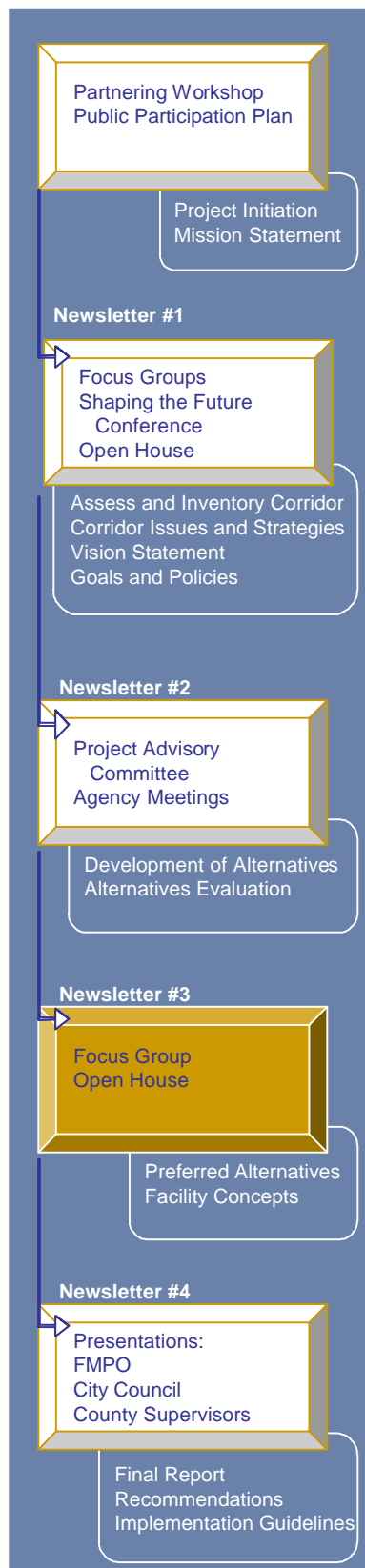
- Downtown area
- The intersection of Milton Road and University Drive
- The intersection of Woodlands Village Boulevard and University Avenue
- The intersection of Woody Mountain Road and West Route 66
- The intersection of Route 66 and Milton Road
- The proposed intersection just east of Woody Mountain Road, west of Forest Meadows Street and south of West Route 66 (this node represents the mixed use neighborhood activity center).

Transportation

Roadway Improvements include a new major collector street extending Clay Avenue along the railroad and connecting to Kaibab Lane. Kaibab Lane would also function as a backage road providing access to properties between West Route 66 and Kaibab Lane. In addition, the minor collector connecting University Avenue to Woody Mountain Road is extended to Flagstaff Ranch Road. Overall, the concept introduces far more cross streets to Milton and West Route 66 to support access to and from the activity centers and backage roads. In addition, Riordan Ranch Street extends north opposite of West Route 66. Additional local streets are added to provide connectivity and local access especially in the mixed-use centers.

Package C assumes a denser network of pedestrian and bicycle facilities on new and existing streets as well as on the off-street multiuse trail system. In addition, a higher level of transit use is assumed regionwide. Based on an assumed higher use of alternative modes such as transit, bicycling, and walking the trip share for alternative modes is assumed to be 11 percent regionwide, the same modal share as the adopted RLTP. Package C includes full access management control – four-lane divided roadway, raised medians reduced number of driveways with right-turn in and right-turn out movements, and predominant access along backage roads.

5. EVALUATION OF ALTERNATIVE MOBILITY PACKAGES



This chapter presents the results of the evaluation of the three alternative mobility packages for the two study corridors. The packages were evaluated in regard to traffic, land use/transportation relationships, and multimodal facilities. In addition, the safety benefits of implementing access management along Milton Road/East Route 66 and West Route 66 are analyzed. Figure 14 illustrates the overall methodology that was used to analyze the packages. The following describes the evaluation process and presents the evaluation results.

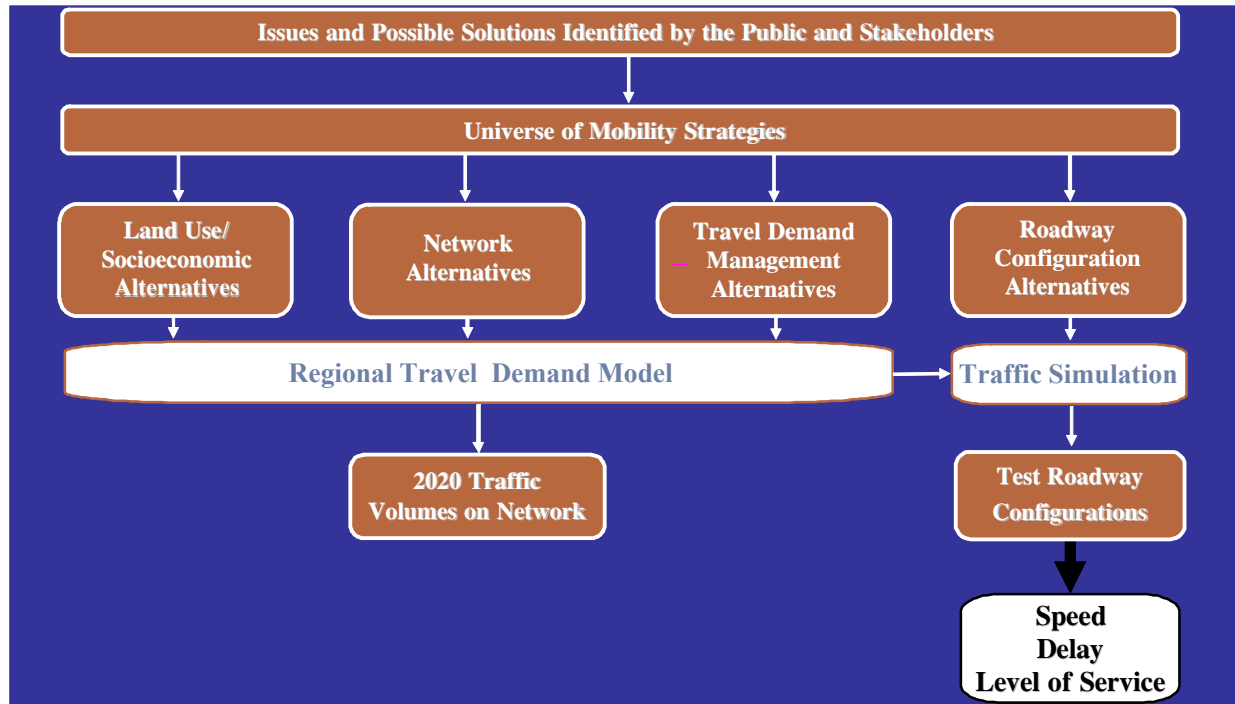
TRAFFIC EVALUATION METHODOLOGY

The traffic evaluation portion of the analysis consisted of first forecasting 2020 daily traffic volumes for each alternative package. Each package described in the previous chapter represents specific components of land use, street network, levels of access management, and assumed mode shift for alternative modes. Daily traffic volumes for 2020 were estimated for each package using the FMPO regional travel demand model. Given the daily traffic volumes for each package, the Synchro/SimTraffic simulation model was used to estimate both intersection and arterial levels of service on Milton Road/East Route 66 and West Route 66. The simulation model was also used to view the simulated traffic in order to identify problem areas.

2020 Daily Traffic Forecasts

The FMPO regional travel demand model was used to forecast 2020 daily traffic volumes for the study corridors. The regional travel demand model was previously developed and calibrated using the TransCAD travel demand management software. The travel demand model forecasts daily traffic volumes based on projected land uses and the street and highway network for each package. The travel demand model was also adjusted for each package to account for variations in modal shift to alternative modes such as transit, bicycling, and walking.

FIGURE 14. ANALYSIS FLOW CHART



Traffic Operations Simulation

The Synchro/SimTraffic, Version 5.0 software was used to simulate hourly traffic operations on Milton Road/East Route 66 and West Route 66 for each package. The mid-day hour was simulated as the “worse case” peak hour and was derived from the daily traffic volumes output from the regional travel demand model. The Synchro software was used to analyze arterial and intersection level of service during the mid-day peak hour based on the methods of the *Highway Capacity Manual (HCM) 2000*. The input data for the software included the following information: type of intersection, either signalized or unsignalized; distance between the intersections; number and type of approach lanes— through, left-, and right-turn lanes; and the approach traffic volumes. SimTraffic, a companion software product to Synchro for performing microscopic simulation and animation, was used to visually review traffic operations for each of the packages. SimTraffic was used to evaluate the impact of queuing and blocking, since Synchro or HCM methods do not account for “bottleneck” situations where upstream traffic deficiencies, such as queuing problems that block movements, may reduce the amount of traffic reaching downstream intersections.

Signalized and Unsignalized Intersection Analysis

The concept of level of service for signalized and unsignalized intersections uses the average control delay in seconds per vehicle (sec/veh) as the primary measure of effectiveness in evaluating the level of service at signalized and unsignalized intersections. Average control delay in seconds per vehicle is computed for each lane group, then aggregated into approach

and intersection delay for signalized intersections. Six levels of service are defined for each type of facility by letter designations from A to F, with LOS A representing the best operating conditions with the lowest delay, and LOS F the worst conditions. Delay for a signalized intersection is given for the overall intersection with the level of service being converted to a corresponding letter. The level of service criteria for an unsignalized intersection is different in that overall intersection delay and LOS is not calculated, so delay and LOS is given by approach and individual movements.

The LOS criteria for signalized and unsignalized intersections are shown in Table 4.

TABLE 4. LEVEL OF SERVICE CRITERIA

LOS	Signalized Control Delay (sec/veh)	Unsignalized Control Delay (sec/veh)
A	< 10	0-10
B	> 10-20	11-15
C	> 20-35	16-25
D	> 35-55	26-35
E	> 55-80	36-50
F	> 80	> 50

Source: Highway Capacity Manual 2000

Arterial Analysis

Level of service analysis for arterial segments was conducted using Synchro. The software automatically determines the Arterial Class (I, II, III or IV) based on the distances between intersections and the speed on the links, or roadway segments. A Class I Arterial is a high-speed (45-55 miles per hour) principal arterial, generally multilane and divided or undivided. A Class II Arterial is a suburban arterial, generally multilane and divided or undivided with posted speed limits between 40 and 45 mph. A Class III Arterial is in an intermediate area with moderate density with posted speed limits between 30 and 40 mph. A Class IV Arterial is in an urban area, generally undivided with posted speed limits between 25 and 35 mph.

The resulting speed on the link is the total distance divided by the total computed travel time, and the link distance is the total distance divided by the number of links. The signal delay is the percentile delay for the through lane group, which is equal to 1.3 times the stopped delay. The travel time given by Synchro 5.0 is equal to the running time plus the signal delay.

FINDINGS OF THE TRAFFIC EVALUATION

Alternative Package A

Areawide Mobility Effects

- If the 2020 planned transportation improvements as identified in the adopted RLTP are not implemented, traffic volumes along the study corridors will increase significantly in addition to other surface streets. Subsequently, traffic operations along Milton Road and Route 66 will deteriorate considerably.
- As shown in Table 5, the total regional daily vehicle miles traveled (VMT) for Packages A and B are approximately 3.2 million VMT. The daily VMT for Package C is lower at approximately 3.1 million VMT due to the increased modal shift. Overall operating speed is also higher for Package C due to the lower VMT. Table 6 compares the traffic volumes on selected segments on the state routes.
- Increased trip shares of pedestrian, bicycle, and transit trips would need to be implemented in order to reduce the amount of vehicular traffic volumes. The region must allocate funding to provide multimodal opportunities to reduce traffic volumes.
- The implementation of the improvements in the adopted RLTP will keep daily traffic volumes at approximately the same levels as today. This is primarily due to two factors. First, traffic volumes are redistributed to the Lone Tree Traffic Interchange and the Lone Tree overpass that are included in the adopted RLTP. Second, traffic volumes are reduced as a result of the assumed increased trip share of the pedestrian, bicycle, and transit modes. Some changes in traffic volumes are noticeable:
 - West Route 66 carries more traffic (about 20%) in 2020 than today due to the fact that higher densities and additional land uses are predicted for the western portion of the study area.
 - Traffic volumes on Milton Road remain approximately the same except for the segment between University Drive and the intersection with West Route 66 where volumes are considerably reduced. Two effects are contributing to this traffic flow pattern. First, Milton Road north of the intersection with West Route 66 remains as the major thoroughfare into downtown Flagstaff. Like the situation today, the roadway functions at or above capacity in the year 2020. While the additional connection in the regional network provides relief, the bottleneck through the underpass will remain. The second effect, lower traffic volumes north of University Drive are most likely the result of the more continuous parallel facilities along Milton Road. Some traffic will use the extension of Beulah Boulevard and relieve Milton Road.
- The extension of parallel roadway facilities to Milton Road such as Beulah Boulevard and Riordan Ranch Street will improve circulation opportunities for businesses along Milton Road. This will also reduce side friction of turning movements along Milton Road by displacing the short interactive commercial trips along these parallel facilities or backage roads.

TABLE 5. FLAGSTAFF TRANSPORTATION PLANNING MODEL REGIONAL TRAVEL MEASURES - FLAGSTAFF URBAN MOBILITY STUDY

Alternative	Mode Shift %	Total Trips	Vehicle Miles Travel	Vehicle Hours Travel	Overall Operating Speed
A	4%	563,724	3,252,168	81,100	40.10
B	4%	563,724	3,254,694	81,161	40.10
C	11%	530,309	3,151,396	75,070	41.98

TABLE 6. COMPARISON OF TRAFFIC VOLUMES ON SELECTED SEGMENTS

Segment	Alt A With 4% Mode Shift	Alt B With 4% Mode Shift	Percent Difference To Alt A	Alt C With 11% Mode Shift	Percent Difference To Alt A
Milton					
North of Forest Meadows	38,072	36,724	-4%	33,809	-11%
North of University Avenue	31,438	26,870	-15%	24,357	-23%
South of West Route 66	26,556	25,160	-5%	20,615	-22%
South of Butler	50,623	50,716	0%	49,446	-2%
South of Phoenix	42,075	42,120	0%	40,286	-4%
East 66					
West Of Humphreys	41,856	41,983	0%	40,443	-3%
East of Beaver	29,361	29,002	-1%	28,076	-4%
Humphreys					
North of East 66	19,006	19,066	0%	18,625	-2%
North of Cherry	15,896	16,072	1%	15,268	-4%
West 66					
West of Milton	24,537	25,753	5%	24,707	1%
East of Woodlands Village Blvd.	30,180	28,313	-6%	28,006	-7%
East of Flagstaff Ranch Road	6,723	6,307	-6%	6,702	0%

Alt A is the approved 2020 Regional Land use and Transportation Plan

Alt B is the approved 2020 Regional Land use and Transportation Plan plus light capitalization

Alt C is the approved 2020 Regional Land use and Transportation Plan plus heavy capitalization

Milton Road

Arterial Operation

- The comparison of traffic volumes along Milton Road is presented in Figure 15 for the three alternative packages.
- The accumulative travel time on northbound Milton Road between Forest Meadows and Beaver Street is shorter for Alternative A than for the existing travel time. In addition, the accumulative travel time is shorter than for Alternative B. Figure 16

FIGURE 15. COMPARISON OF TRAFFIC VOLUMES ON MILTON ROAD

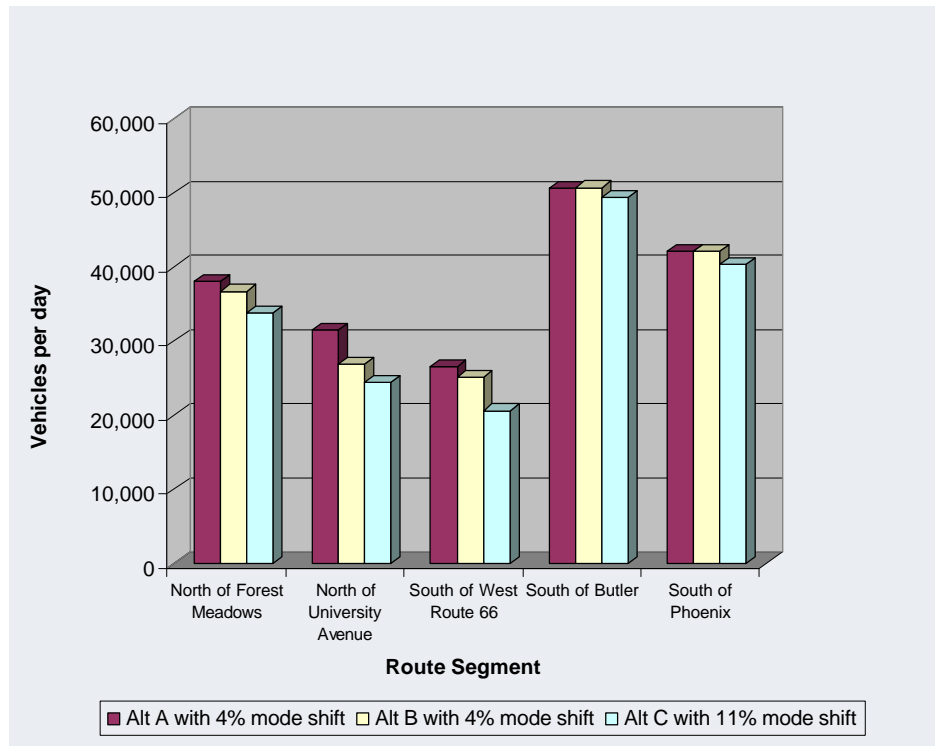
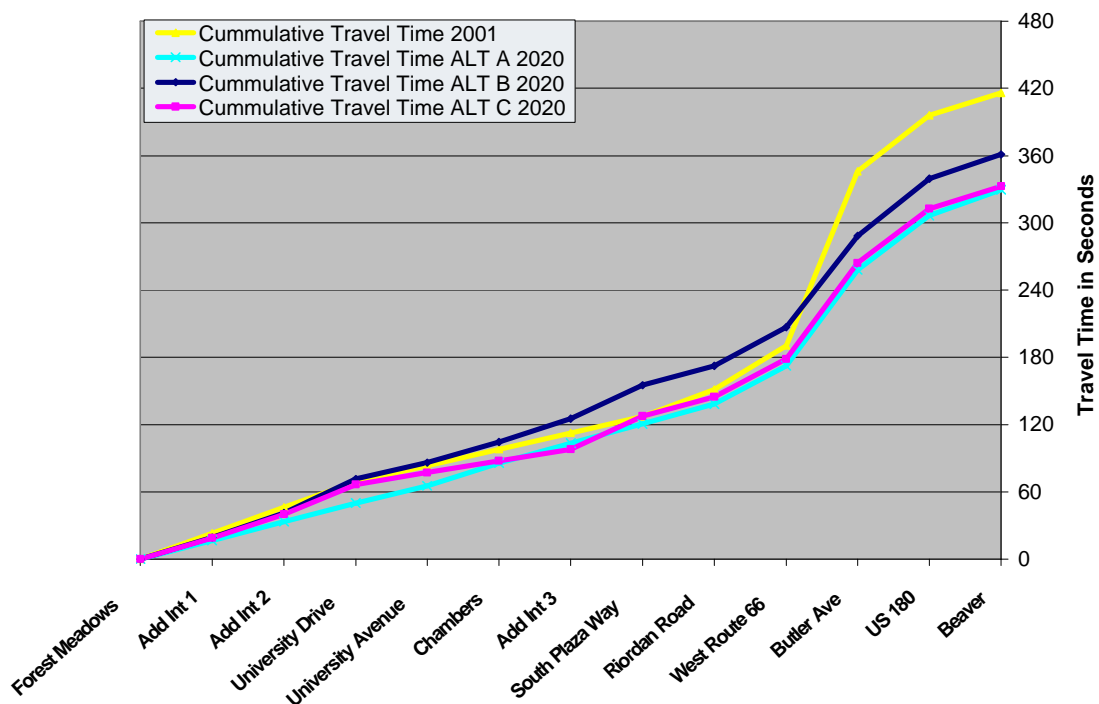


FIGURE 16. COMPARISON OF CUMULATIVE TRAVEL TIME NORTHBOUND ON MILTON ROAD/EAST ROUTE 66 FROM FOREST MEADOWS TO BEAVER STREET - NOON HOUR

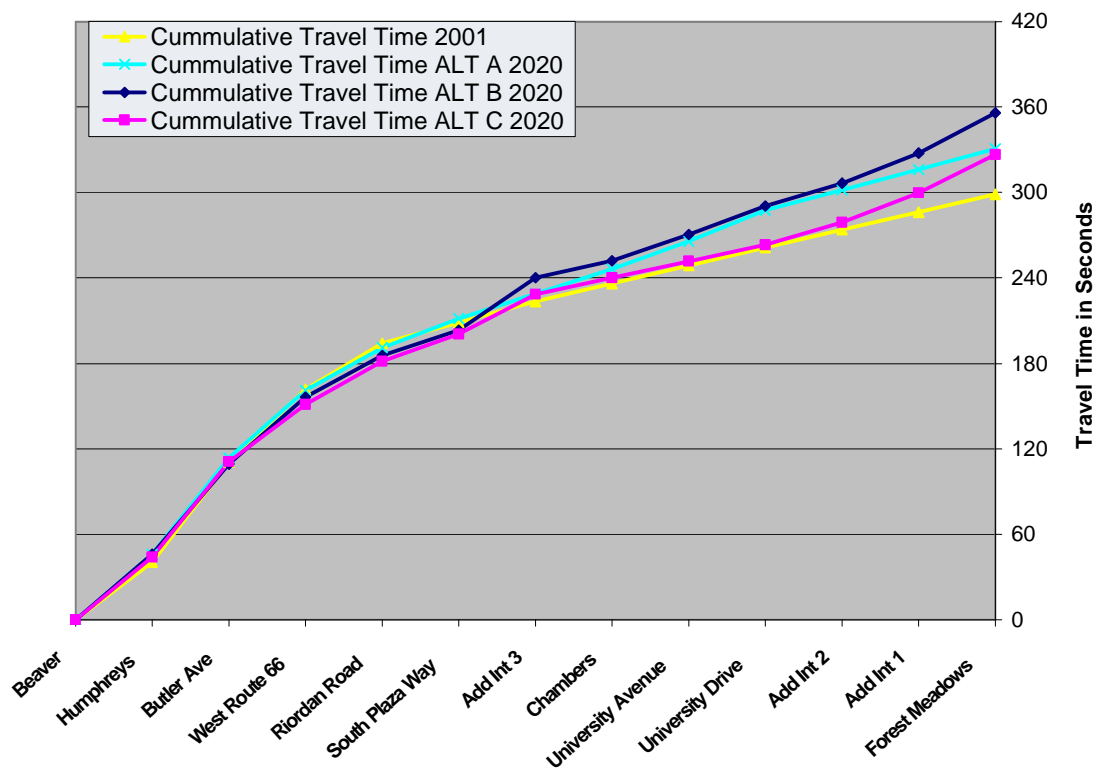


presents the accumulative travel times for northbound travel movement on Milton Road/East Route 66 from Forest Meadows to Beaver Street. Conversely, the southbound accumulative travel times are shown in Figure 17.

- Arterial levels-of-service for segments along Milton Road were reviewed for level of service E or worse. The westbound segment of East Route 66 between Humphreys Street and Beaver Street operates at an arterial level of service F.
- The arterial operation from Butler Avenue to Humphreys Street is deteriorated since one of two of the eastbound travel lanes is blocked by traffic waiting to turn left on Humphreys Street.

The analysis of arterial traffic signalization along Milton Road using Synchro's optimization method indicates that operating speeds could be improved by approximately two miles per hour and arterial level of service by approximately one level in certain segments.

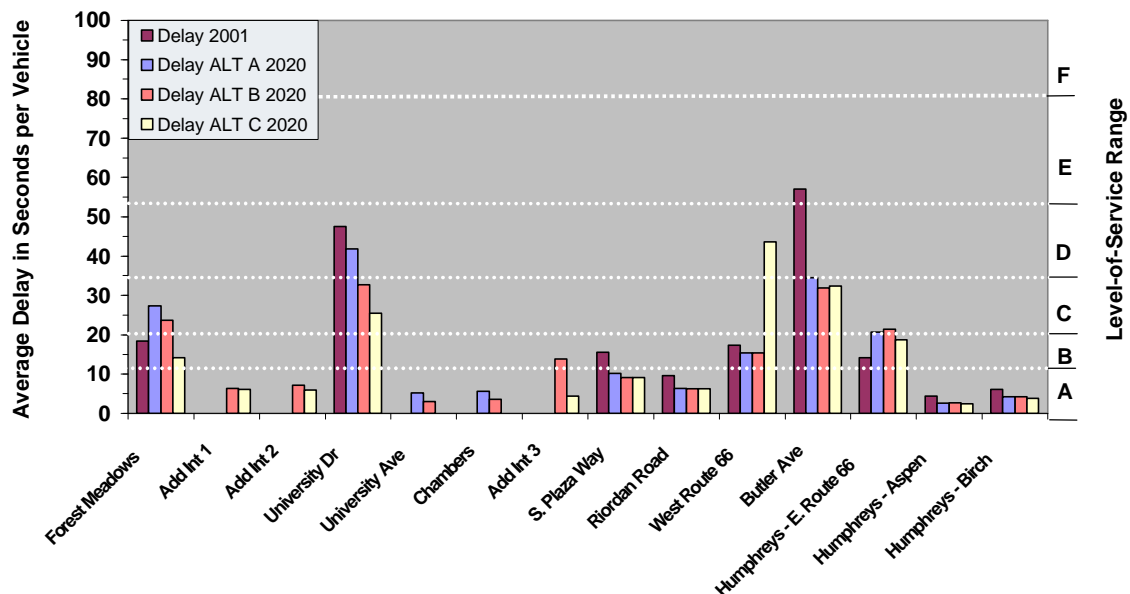
FIGURE 17. COMPARISON OF CUMULATIVE TRAVEL TIME SOUTHBOUND ON MILTON ROAD/EAST ROUTE 66 FROM FOREST MEADOWS TO BEAVER STREET - NOON HOUR



Intersection Operation

- Overall intersection level of service for the signalized intersections is generally at level of service D or better for Package A (see Figure 18). However, individual traffic movements operate at level of service E or worse, as shown on Table 7. In general, the LOS at uncontrolled intersections is at acceptable levels of service.

FIGURE 18. SIGNALIZED INTERSECTION DELAY AND LEVEL OF SERVICE FOR INTERSECTIONS ALONG MILTON ROAD AND HUMPHREYS STREET MID-DAY HOUR



The graphic displays data for mainline intersection delay, individual approaches on selected intersections however, can vary considerably from the overall intersection Level of Service.

TABLE 7. SPECIFIC LEVEL OF SERVICE TURN MOVEMENTS

Signalized Intersection	Turn Movement	Level-of-Service
Milton Road & University Drive	Southbound to Eastbound Left Turn	F
Milton Road & Clay Avenue	Westbound Through	E

- The eastbound to northbound left-turn movement at the intersection of East Route 66/Humphreys Street operates at an acceptable level of service based on urban area standards. However, current field observations and analyses indicate the queue of traffic waiting to make the left turn backs up beyond the storage lane into the inside through travel lane along East Route 66. Although the specific turning movement and intersection operate at an acceptable urban level of service, inadequate storage of the northbound left turns restricts East Route 66 to one eastbound through lane. During

periods of the day, left-turning traffic backs up as many as 30 vehicles or approximately 750 feet west of the Humphreys Street intersection. A northbound left-turn movement at East Route 66/Sitgreaves immediately west of the East Route 66/Humphreys intersection compounds the traffic operations with Humphreys Street northbound left-turn queue. Safety problems are a result of the traffic queuing between the BNSF Railroad Bridge and Humphreys Street. Chapter 2 presents additional detail on the crash analysis of this area.

- Some existing unsignalized intersections may warrant signalization in the future due to increased traffic volumes. These intersections include University Avenue and Chambers Drive.

West Route 66

Arterial Operation

- Arterial levels-of-service for segments along West Route 66 operate at a level of service C or better except that the eastbound and westbound segment of West Route 66 between Woodlands Village Boulevard and Yale Street operates at a level of service D. For optimized arterial traffic signalization, this segment improves to a level of service C. However, the eastbound segment between Thompson Street and Woodlands Village Boulevard operates at a level of service D for optimized conditions. This specific level of service degradation is probably due to an adjustment in the green time for progression along the entire corridor.

Intersection Operation

- The overall intersection levels-of-service for the signalized intersections operate at a level of service B or better. In general, the level of service at uncontrolled intersections operates at acceptable levels-of-service. Although the estimated traffic volumes on Riordan Road at West Route 66 may not warrant a traffic signal, the Riordan Road northbound left turn operates at a level of service F.
- The existing unsignalized intersection at West Route 66 and Yale Street may warrant traffic signal control in the future due to increased traffic volumes.

Alternative Package A Without Access Management

In order to evaluate the effect of access management on traffic operations, speeds were adjusted for Package A to reflect expected increases in vehicle speeds due to fewer driveways and raised medians. Speeds were adjusted using values found in the professional literature. Only Package A was evaluated without access management since the relative changes in vehicle speeds for Packages B and C are expected to be similar.

Areawide Mobility Effects

- The overall areawide mobility effects of this Package are similar to Package A. Although traffic volumes along the corridors are anticipated to remain the same, lower speeds and increased travel times will occur along Milton Road, East Route 66, and West Route 66 without access management.

Arterial Operation

- Arterial speeds on Milton Road/East Route 66 and portions of West Route 66 are lower due to conflicts of through vehicles and vehicles turning left from the two-way center left-turn lane. In addition, vehicle-vehicle, vehicle-pedestrian, and vehicle-bicycle conflicts at driveways also decrease arterial speeds.
- Levels-of-service on arterial segments are reduced by up to two levels depending on the number of driveways within the segment. Many of the arterial levels-of-service are level of service E or worse. Arterial speeds and levels-of-service deteriorate on the arterial segments without access management. Figures 19 and 20 illustrate the comparison of cumulative travel times along Milton Road revealing that deterioration of travel times are greater without access management for northbound and southbound travel respectively.

**FIGURE 19. COMPARISON OF CUMULATIVE TRAVEL TIME NORTHBOUND ON MILTON ROAD/EAST ROUTE 66 FROM FOREST MEADOWS TO BEAVER STREET WITH AND WITHOUT ACCESS MANAGEMENT
MID-DAY HOUR - ALTERNATIVE A**

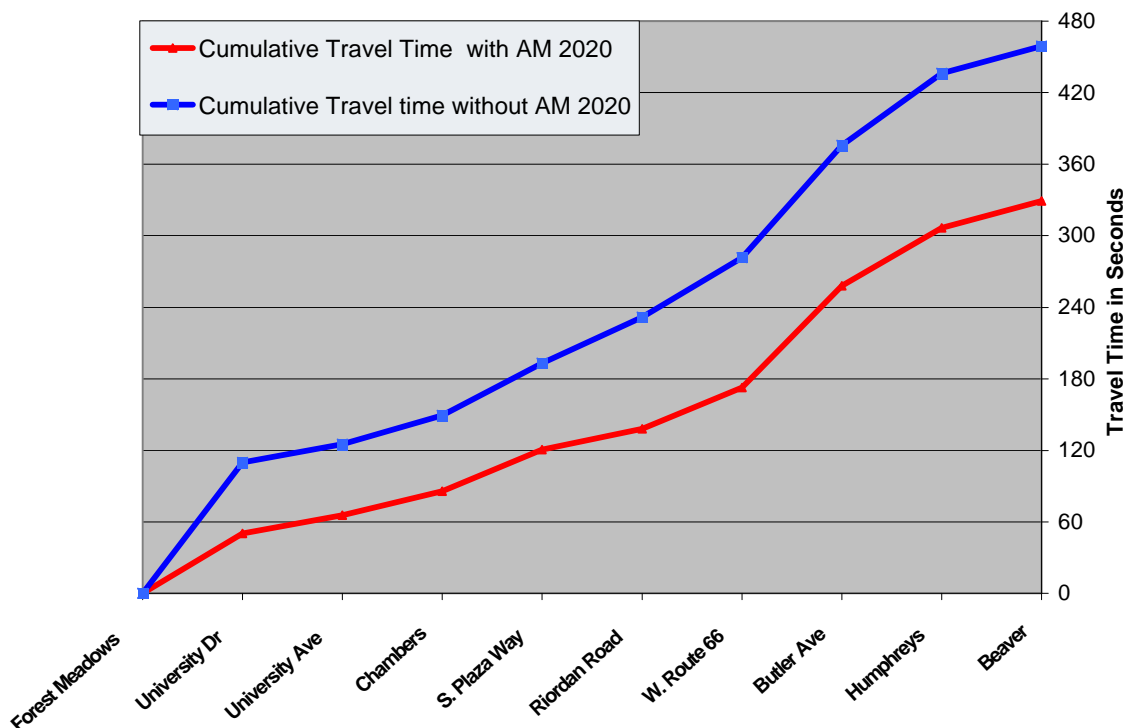
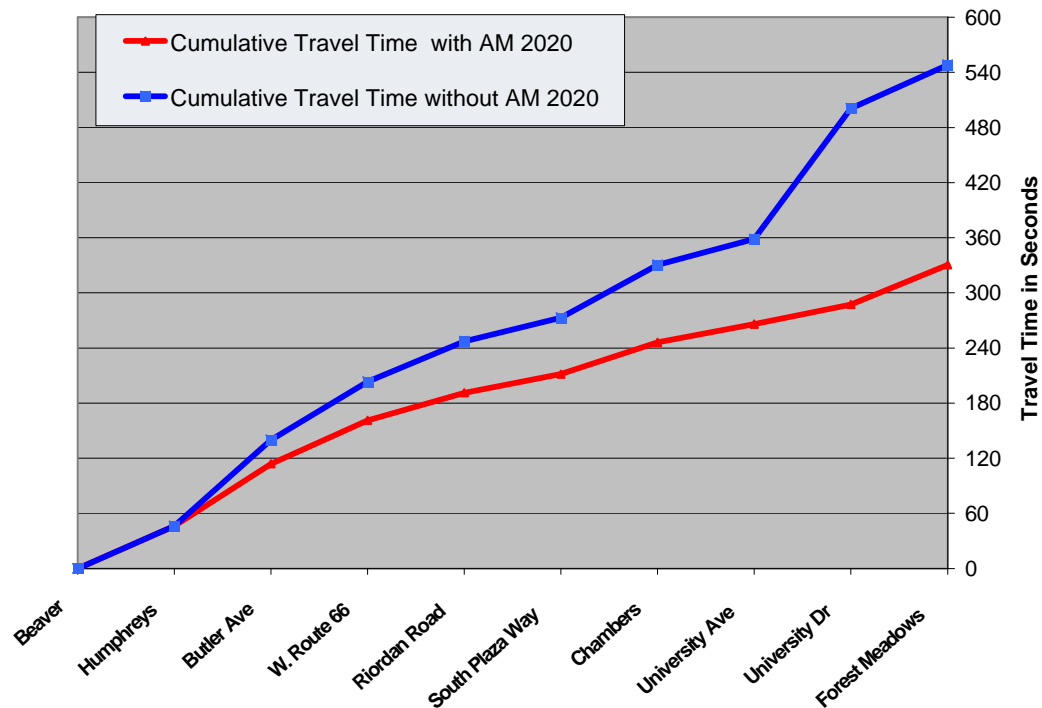


FIGURE 20. COMPARISON OF CUMULATIVE TRAVEL TIME SOUTHBOUND ON MILTON ROAD/EAST ROUTE 66 FROM BEAVER STREET TO FOREST MEADOWS WITH AND WITHOUT ACCESS MANAGEMENT MID-DAY HOUR - ALTERNATIVE A



Intersection Operation

- Traffic operations along the arterial segments will be adversely impacted without access management. However, intersection level of service is generally not impacted without access management along the highway.

Safety Benefits of Access Management

Many studies have shown that crash rates increase with the density of access points in both travel directions. Table 8 relates access density with a crash rate index that represents crash rates for various roadway segments. The accident rate indexes shown in Table 8 were derived using ten access points per mile as a base. To compare crash rates with access density, the base crash rate index is set to a value of 1 for 10 access points per mile. The table shows that crash rates (as expressed through the crash rate index) increases as the number of access points per mile increases. For example, a roadway with 60 access points per mile would be expected to have an accident rate 3 times higher than a segment with 10 access points per mile.

TABLE 8. CRASH RATE INDICES

Access Density	
Total Access Points per Mile (Both Directions)	Crash Rate Index
10	1.0
20	1.3
30	1.7
40	2.1
50	2.8
60	4.1

Source: NCHRP Report 420, Impacts of Access Management Techniques.

Table 9 correlates the number of signalized intersections with the number of driveways and the resulting crash rate. The higher the number of signalized and unsignalized intersections along a roadway the higher the crash rate. Access management minimizes vehicle and pedestrian conflicts through the reduction and management of access points. The results on reducing crashes can be dramatic. Figure 21 illustrates how crashes are significantly reduced with a high degree of access management compared to unmanaged access.

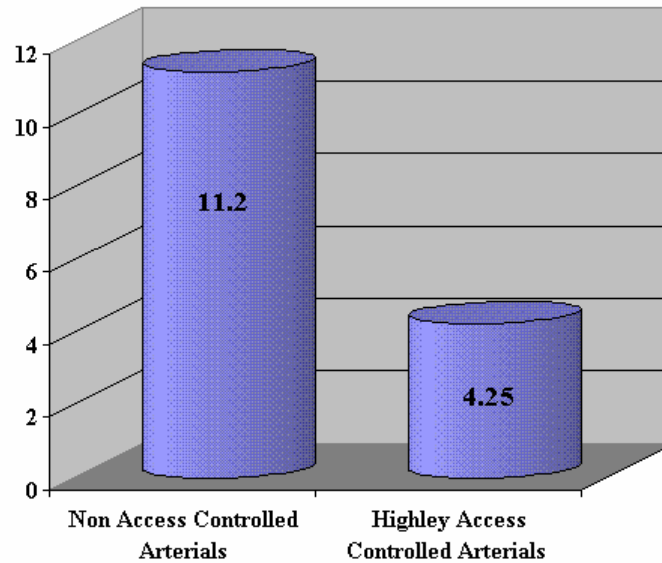
The *NCHRP Report 420* also reviewed the impact of various spacing and median types. Table 10 shows that accident rates increase as the total access points per mile increase as a function of the median treatment. The crash rates also decrease as the median treatment becomes more restrictive. For example, a roadway section with a non-traversable median will have a lower accident rate than an undivided roadway segment.

TABLE 9. REPRESENTATIVE CRASH RATES (CRASHES PER MILLION VMT) BY ACCESS DENSITY - URBAN AND SUBURBAN AREAS

Signalized Access Points per Mile	Unsignalized Access Points per Mile			
	≤20	20.01—40	40.01—60	≥60
<2.01	2.63	4.33	3.01	3.80
2.01—4	3.94	5.58	8.30	8.22
4.01—6	4.83	6.91	8.37	8.54
>6	8.61	8.06	11.30	9.53
All	3.76	6.26	7.47	8.42

Source: NCHRP Report 420, Impacts of Access Management Techniques.

**FIGURE 21. AVERAGE CRASHES
PER MILLION VEHICLE MILES – DENVER**



Source: Lima & Associates, based on Florida Department of Transportation, *Access Management, An Important Traffic Management Strategy*, Undated Presentation.

**TABLE 10. REPRESENTATIVE CRASH RATES (CRASHES PER MILLION VMT)
BY TYPE OF MEDIAN - URBAN AND SUBURBAN AREAS**

Total Access Points per Mile (1)	Median Type		
	Undivided	Two-way Left-Turn Lane	Non-Traversable Median
≤20	3.82	N/A	2.94
20.01—40	8.27	5.87	5.13
40.01 —60	9.35	7.43	6.47
≥60	9.55	9.17	5.40
All	8.59	6.88	5.19

(1) Includes both signalized and unsignalized access points

Source: NCHRP Report 420, Impacts of Access Management Techniques

Minnesota's Department of Transportation: *Statistical Relationship Between Vehicular Crashes and Highway Access, 1998* presented the following conclusions:

- There is an observed positive relationship between access density and crash rates in ten of the eleven analyzed highway categories. Higher levels of access density resulted in higher crash rates.

- The data suggests that there is an inverse relationship between speed and crash rates.
- Roadway segments with the highest crash rates have high levels of access density and segments with the lowest crash rates have low levels of access density.
- There is an observed positive relationship between the density of commercial driveways and crash rates on urban roadways.
- A review of case studies of eleven access management related projects documented an average crash reduction of approximately 40 percent.

The final conclusion of the study is that access management is a legitimate public safety issue.

Potential Safety Benefits of Access Management Measures on Corridor Segment

Between Forest Meadows Road and Beaver Street there are 96 access points including 18 intersection, and 78 driveways, 36 driveways on the east side and 42 driveways on the west side. This section analyzes only the potential safety benefits of driveway closures along Milton Road. Any potential street closures in the future could also be analyzed.

The potential effect of driveway consolidation on reducing crashes in the corridor segments were analyzed using the data in Table 8. Crash Rate Indices. The following methodology was used:

1. Based on the number of accidents, segment length, and average daily traffic volumes an accident rate is calculated.
2. Based on the number of driveways per segment, a driveway density (driveways per mile) is calculated.
3. The assumption is made that 50 percent of all driveways will be consolidated.
4. The 50 percent reduction in driveways is correlated with the NCHRP accident rate index.
5. A potential reduction in accidents is then calculated.

As shown in Table 11, depending on the initial driveway density, considerable reduction in accidents can be achieved through the reduction of driveways. Along Milton Road/East Route 66 the total number of crashes could be reduced from 328 to 185 accidents, a 42 percent reduction. Along individual segments, the reduction can be even higher. Along West Route 66 the total number of accidents could be reduced by 55 percent. Other measures such as the type of median will also influence the crash rates along the corridor segments.

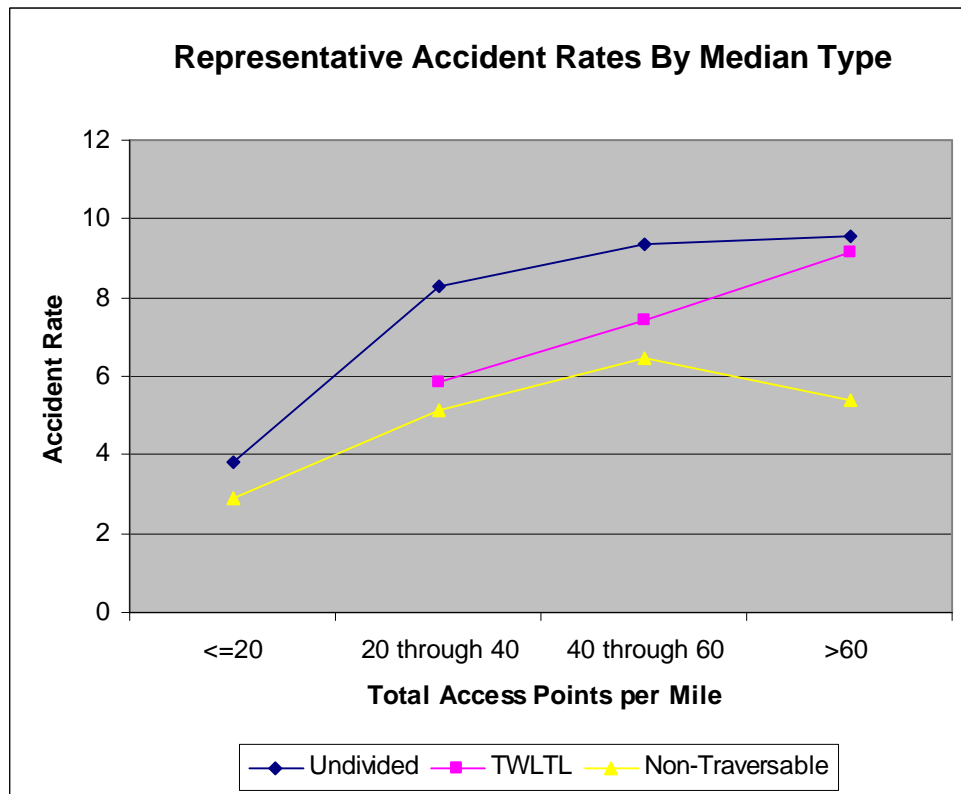
As shown in Figure 22, the addition of a non traversable median will considerably reduce crashes along the study corridor. In areas with high driveway densities the reduction in the accident rate can be up to 40 percent. The effectiveness of a median as a safety feature is in direct correlation with the driveway density and related accident rates.

**TABLE 11. POTENTIAL IMPACT OF DRIVEWAY REDUCTION
ON CRASHES FOR MILTON ROAD/EAST ROUTE 66 AND WEST ROUTE 66**

Location	Number of Accidents in Segment	Number of Driveways in Segment	Driveway Density: Driveways per Mile	Assumed Driveway Density per Mile 50% Reduced	Change to Accident Index*	Estimated Number of Accidents After Access Management Implementation	No. of Accidents Reduced
Milton /East Route 66							
McConnell Dr to Forest Meadows St	8	2	22	11	25.4%	6.0	2.0
Forest Meadows St to University Dr	22	16	53	27	51.7%	10.6	11.4
University Dr to University Ave	22	2	29	14	30.9%	15.2	6.8
University Ave to Chambers Dr	18	4	40	20	38.1%	11.1	6.9
Chambers Dr to South Plaza Way	12	18	75	38	66.6%	4.0	8.0
South Plaza Way to Riordan Rd	29	4	50	25	46.4%	15.5	13.5
Riordan Rd to West Route 66	11	13	59	30	58.2%	4.6	6.4
West Route 66 to Butler	44	7	28	14	30.9%	30.4	13.6
Butler Ave to Humphreys	159	14	48	24	45.1%	87.3	71.7
Humphreys St to Beaver St	3	0	0	0	0.0%	0.0	0.0
Subtotal	328	80			39.3%	184.7	140.3
West Route 66							
Flagstaff Ranch Rd to Woody Mountain Rd	6	5	5	2	0.0%	0.0	6.0
Woody Mountain Rd to Thompson St	25	16	18	9	19.4%	20.2	4.8
Thompson St to Woodlands Village Blvd/Young St	15	1	3	1	0.0%	0.0	15.0
Woodlands Village Blvd/Young St to Yale St	96	8	53	27	51.7%	46.3	49.7
Yale St to Riordan Rd	138	15	58	29	56.3%	60.3	77.7
Riordan Rd to Blackbird Roost	3	12	71	35	64.8%	1.0	2.0
Blackbird Roost to Milton Rd	4	7	58	29	56.8%	1.7	2.3
Subtotal	287.0	64.0			35.6%	129.6	157.4

*See Table 8

FIGURE 22. REPRESENTATIVE CRASH RATES BY MEDIAN TYPE



Source: NCHRP Report 420, Impacts of Access Management Techniques

Alternative Package B

Areawide Mobility Effects

- Table 5 compares the traffic performance of Package B to Packages A and C. Similar to Package A, Milton Road north of West Route 66 is a major thoroughfare into downtown. Although the transportation improvements as identified in the adopted RLTP reduce traffic along Milton Road, the bottleneck through the BNSF railway underpass will remain.
- The queuing problems on East Route 66 from the vehicles turning left onto Humphreys Street will continue to exist in Package B.

Arterial Operation

- Due to the closer spacing of intersections, arterial levels-of-service along certain segments of Milton Road are deteriorated, resulting from increased travel times. See Figures 19 and 20 for comparison of cumulative travel times on Milton Road.

Intersection Operation

- The levels-of-service for the signalized intersections of Forest Meadows, University Drive, and South Plaza Way on Milton Road are improved since traffic is distributed through more intersections and parallel connections. However, travel times along the corridor will deteriorate due to the closer intersection spacing. Figure 18 presents the signalized intersection delays and level of service.

Alternative Package C

Areawide Mobility Effects

- Table 5 compares the traffic performance of Package C to Packages A and B. Milton Road north of West Route 66 is a major thoroughfare into downtown similar to Packages A and B. Although the transportation improvements as identified in the adopted RLTP reduce traffic along Milton Road, the bottleneck through the BNSF railway underpass will remain.
- The queuing problems on East Route 66 from the vehicles turning left onto Humphreys Street will continue to exist in Package C.
- The increased eleven percent trip share for pedestrian, bicycle, and transit as compared to the four percent in Alternative Packages A and B, further reduces vehicular trips on the regional network.

Arterial Operation

- The addition of intersections along Milton Road increases travel time on the segments created by these intersections. See Figures 19 and 20 for comparison of cumulative travel times on Milton Road.

Intersection Operation

- The levels-of-service of the signalized intersections of Forest Meadows and South Plaza Way on Milton Road are improved for Package C since traffic is distributed through more intersections and parallel connections. Also, there is the increased share of mode shift which reduces vehicle trips along Milton Road. However, the arterial level of service on Milton Road is deteriorated in certain sections resulting from increased travel times due to the closer spacing of intersections.

EVALUATION OF LAND USE/TRANSPORTATION RELATIONSHIPS

Alternative Package A

The land use within the study corridors for this alternative is highly auto oriented with little support for pedestrian and bicycle connections. Low to mid density residential uses and spatially dispersed commercial uses do not encourage the development of strong transit, bicycling, and walking use. However, as land parcels redevelop under the proposed land use, the application of the Design Review Guidelines can encourage the mixed used development and site orientation necessary to support the multimodal transportation goals.

Alternative Package B

The land use assumed for Alternative Package B concentrates residential and commercial activities at a limited number of nodes within the corridors. Increased density at the nodal activity centers and the mixed-use design of the centers will encourage the reduction in vehicle trips and support increased transit use, and pedestrian and bicycle activity. Properties within the activity centers would need to be redeveloped from strip commercial to more intense mixed-uses.

Alternative Package C

The land use assumed for Alternative Package C has the highest concentration of residential and commercial activities at an additional number of nodes among the three packages. The increased number of nodes with increased density at the nodal activity centers and the mixed-use design of the centers will more strongly support increased transit use, and pedestrian and bicycle activity. The land use in Package C would require significant redevelopment of properties within the activity centers.

TRANSIT, PEDESTRIAN, AND BICYCLE IMPLICATIONS

Alternative Package A

This alternative package consists primarily of the land use and street network in the adopted RLTP. Along Milton Road and West Route 66, the network does not provide significant opportunities for connectivity or opportunities to cross Milton Road or the eastern portion of West Route 66. Walking/bicycling distances are longer than for other alternative packages. The connectivity by transit to activities would be more indirect than the other alternative packages due to fewer intersections and street connections. The assumed four percent shift of trips to alternative modes moderately reduces vehicle trips within the study corridors.

Alternative Package B

Package B has some additional intersections to Alternative Package A. These new intersections would provide some additional opportunities to cross Milton Road and shorten walking/bicycling distances. In addition, Package B includes backage roads parallel to Milton Road that provide opportunities for transit, walking, and bicycling. The construction of backage roads and additional intersections would require redevelopment of adjacent properties. The assumed four percent shift of trips to alternative modes moderately reduces vehicle trips within the study corridors.

Alternative Package C

Alternative Package C assumes investment in new streets, intersections, transit, pedestrians, and bicycle facilities providing a finer grained circulation system. This results in a more grid-like transportation network providing shorter walking/bicycling distances, more opportunities to cross Milton Road, and more connectivity between residential, commercial, and campus activities. However, alternative Package C requires extensive new construction through existing development and would require significant redevelopment of areas adjacent to Milton Road and portions of West Route 66. Package C assumes the highest investment among the three corridors in transit, pedestrian, and bicycling facilities. The assumed eleven percent shift of trips to alternative modes significantly reduces vehicle trips within the study corridors.

SUMMARY OF EVALUATION

Corridor Traffic Operations

- The 2020 transportation improvements in the adopted RLTP will keep traffic volumes in the study corridors at approximately the same level as currently experienced.
- Additional traffic improvements will be needed at a few selected intersections to maintain an adequate level of service and enhance safety.
- The implementation of backage roads parallel to Milton Road and West Route 66 reduces corridor travel times and improves overall vehicle circulation and safety.
- The travel time on Milton Road from I-17 to Beaver for Package A is lower than Package B or C.

Traffic Operations of Downtown Options

- The bottleneck condition between the BNSF Railroad Bridge and Humphreys Street will still exist with the adopted RLTP transportation improvements.

- The construction of an eastbound dual left turn at the East Route 66/Humphreys Street intersection will improve the bottleneck condition.

Land Use/Transportation Relationships

- Concentration of land use activities at selected nodes will reduce trips and significantly strengthen the alternative modes of transit, bicycling, and walking.
- Packages B and C require that properties within the activity centers redevelop from low density to higher density mixed-uses. Package C would require the most redevelopment.
- The number of activity centers and the land use intensity as well as assumed significant investment in alternative modes for Package C, supports alternative modes resulting in less regionwide VMT.

Multimodal Facilities

- Transit service needs to be improved within the corridors to provide a viable alternative to the automobile.
- Improvements are needed for pedestrian and bicycle facilities within the corridor to encourage use of the facilities by providing continuity and connectivity within the study corridors.
- Grade separated crossings are needed for safety and to encourage walking and bicycling.
- Package C provides the best circulation within the corridors for all the modes, with more street connections and cross-street intersections than Packages A and C.

Access Management

- Access management along Milton Road/East Route 66 and West Route 66 will reduce travel time and significantly reduce crashes.

Safety

- Crashes along the Milton Road/East Route 66 and West Route 66 corridors will be significantly reduced by:
 - Consolidating driveways
 - Constructing raised medians
 - Constructing an eastbound dual left-turn lane at the East Route 66/Humphreys intersection

6. ANALYSIS OF DOWNTOWN OPTIONS



This chapter presents the results of the analysis of downtown traffic improvements to correct the critical traffic bottleneck condition that occurs during peak periods on the segment of Milton Road/East Route 66 between Butler Avenue to Humphreys Street. The bottleneck condition is caused by the conflict of eastbound traffic turning onto northbound Humphreys Street with westbound traffic on Eastbound 66, as well as southbound traffic on Humphreys Street turning left onto East Route 66. Eastbound left-turning traffic on Humphreys Street frequently backs up beyond the left-turn storage bay length, causing eastbound traffic to queue in the eastbound through lane. The bottleneck is further complicated by traffic making northbound left turns at Sitgreaves Street. In addition, southbound traffic on Milton Road/East Route 66 between Butler Avenue and Humphreys Street backs up during peak periods. Traffic also backs up on both the southbound and northbound Humphreys Street.

This complex traffic condition on Milton Road/East Route 66 and Humphreys Street is expected to continue in the future as traffic volumes increase. The proposed downtown redevelopment project in various blocks north of East Route 66 and east of Humphreys Street will generate additional traffic in the area. Alternative roadway improvement options were investigated for addressing the bottleneck condition that exists. In addition, traffic operations were evaluated for the roadway network bounded by the BNSF Railroad Bridge on the west and Beaver Street on the east, East Route 66 on the south, and Cherry Avenue on the north. Furthermore, a crash analysis was conducted for the area between Butler Avenue and Humphreys Street.

METHODOLOGY

Options were initially identified and evaluated through a first level screening. The remaining options after the first screening were further evaluated through a second screening. Two new options were identified and evaluated during the second screening process.

All the options were compared against the 2020 Base Option, which includes the transportation improvements and land use

from the Flagstaff Land Use and Transportation Plan. In addition, the 2020 No Build Option was analyzed to describe the future traffic problems in detail if no transportation improvements are made and no additional modal shift occurs.

First Screening

As part of the first screening process, FMPO developed a technique to estimate the intersection delays for each option in the year 2020 at selected locations for each of the options. Intersection delays were estimated using regression equations relating existing delays to existing daily traffic volumes. For estimating the regression equations, existing intersection delays were produced from the Synchro, Version 5.0 software, and daily traffic volumes were produced by the Flagstaff regional travel demand model.

Impacts such as cost, environmental, pedestrian, and others were reviewed. These impacts were rated between a value of -3 and +3, where -3 represents a negative impact and a +3 is a positive impact. The impacts were then summarized based on this numerical screening and ranked.

Second Screening

The second screening evaluated the traffic operations of each option in detail using the Synchro, Version 5.0 traffic analysis software and the SimTraffic software to simulate traffic operations. For this analysis, the 2020 Base Option regional transportation model was modified for each of the second screening options. The daily volumes produced by the regional travel demand model for each option were adjusted to produce the hourly mid-day traffic volumes. These hourly volumes were then entered into the Synchro network models for each of the options. The Synchro software produced the intersection and arterial level of service (LOS) for each of the options and SimTraffic software was used to visually simulate the hourly traffic volumes on the network. Synchro and SimTraffic are described in more detail in *Chapter 2. Assessment of Existing Conditions and Major Issues*.

To illustrate the traffic impact on the neighborhoods and downtown, daily traffic volumes were annotated for various screenlines.

The second screening evaluated the impact criteria that were used for the first screening, but in much more detail. Each option was ranked in accordance to each impact using a scale of -3 to + 3, where a -3 represents a negative impact and a +3 is a positive impact.

FIRST SCREENING RESULTS

As previously noted, the FMPO developed a technique to estimate the intersection delay in the year 2020 at selected locations for each of the options. Table 12 presents the estimated

intersection delays for the initial options. The delays are summed and compared to the 2020 Base Option to determine the percent change in increasing or decreasing the overall vehicle delay. The delays presented in this table were used as one of the impacts in the category of vehicular operations to assess and rank the various options. As previously mentioned, other impacts included cost, environmental, and pedestrian. The evaluation for the first screening is shown in Table 13.

The following options were evaluated in the first screening:

1. Construct a new Sitgreaves Street/Santa Fe Avenue intersection and implement a Birch Avenue-Cherry Avenue one-way loop.
2. Construct connection on the Mike's Pike alignment from Butler Avenue crossing East Route 66 to Humphreys Street.
3. Implement a Humphreys Street and Beaver Street one-way pair.
- 3a. Implement a Humphreys Street and Beaver Street one-way pair and eliminate the left-turn lane at Sitgreaves Street.
4. Implement a Humphrey Street and Beaver Street one-way pair including a grade separation crossing East Route 66 from Humphreys Street along Mike's Pike to Butler Avenue.
5. Implement Humphreys Street and Beaver Street one-way pair with San Francisco two-way.
6. Widen Milton Road from West Route 66 to Humphreys Street and implement a Humphreys Street and Beaver Street one-way pair.
7. Widen Milton Road to six lanes from West Route 66 to Humphreys Street.

Rankings of the initial improvement options were presented to the PAC for review and comment. The PAC extensively debated the pros and cons of each option. The rankings were revised based on input from the PAC and debated at another PAC meeting. Some members of the PAC did not want to advance any of the options. However, agreement was reached to advance two options. After detailed deliberations of each option, Options 1 and 3 were carried forward to the second screening for additional study. The PAC members rejected the widening of Milton Road/East Route 66 and the construction of a grade separated connection of Mikes Pike across East Route 66 to Humphreys Street.

The study team later decided to investigate one of the Mike's Pike options in more detail in order to include a high capacity alternative that grade-separates traffic movements at the East Route 66/Humphreys Street intersection. Although the first screening ranked Option 2 slightly higher than Option 4, due to the construction issues, Option 4 was further evaluated. After further analysis, this option was not taken to the second screening traffic analysis stage because of major constructability issues. These issues include, but are not limited to, the overall cost of constructing this option, and the feasibility of constructing a grade separation over the railroad and East Route 66 and coming back down to grade within as short a distance as possible.

TABLE 12. ESTIMATED TOTAL DELAY IN YEAR 2020 AT SELECTED INTERSECTIONS

Intersection	2020 Base Option	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7
East Route 66/Humphreys	37.2	8.4	28.7	17.7	19.1	22.1	51.6	70.4
East Route 66/Beaver	24.8	30.0	26.3	33.4	39.5	30.1	66.5	34.9
East Route 66/Sitgreaves	6.7	20.3	7.2	7.0	7.2	7.1	7.1	6.9
East Route 66/San Francisco	18.5	11.9	9.6	13.0	7.1	31.7	7.2	7.3
East Route 66/Verde	10.8	10.4	10.9	10.6	10.5	10.1	11.1	10.9
Aspen/US 180	7.9	6.8	7.0	7.6	7.1	7.0	7.8	9.1
Aspen/Beaver	6.5	6.5	6.9	7.3	7.3	7.3	7.2	6.6
Aspen/San Francisco	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Birch/US 180	6.9	7.2	7.5	6.9	6.7	6.8	6.7	7.0
Birch/Beaver	6.9	6.7	7.0	7.1	6.8	6.6	6.8	6.7
Birch/San Francisco	6.5	6.4	6.5	6.4	6.4	6.4	6.4	6.4
Butler/Milton	47.5	60.5	49.0	59.5	50.3	55.6	125.8	125.8
Total	186.7	181.8	172.9	183.0	174.5	197.3	310.6	298.5
Change from 2020 Base	100%	97%	93%	98%	93%	106%	166%	160%

TABLE 13. DOWNTOWN ALTERNATIVES EVALUATION – FIRST SCREENING

Impact	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7
Vehicular Operations	2	3	2	2	1	1	1
Cost	2	-3	3	-3	-3	-2	-2
Environmental	1	-2	1	-2	-2	-1	1
R-O-W	0	-2	0	-2	-2	-2	-2
Constructability	2	-3	3	-3	-3	2	2
Social Acceptance	2	-3	2	-3	-3	0	0
Political Acceptance	0	-1	0	-1	-1	-1	-1
Safety	1	3	1	3	3	1	1
Pedestrian	-1	2	-1	2	2	-1	-1
Average	1	-0.7	1.2	-0.8	-0.9	-0.4	-0.2
Rank	2	5	1	6	7	4	3

SECOND SCREENING RESULTS - TRAFFIC ANALYSIS

This section presents the detailed traffic analyses of four downtown improvement options, (See Figure 23). In addition, the 2020 No Build Option was analyzed to describe the future traffic problems if no improvements are made, and the 2020 Base Option was analyzed to compare against the downtown improvement options.

As previously noted, the second screening evaluated the traffic operations of each option using the Synchro, Version 5.0 traffic analysis software and the SimTraffic software to simulate traffic operations. Chapter 2 describes the Synchro and SimTraffic software as analysis tools. SimTraffic was used to perform microscopic simulation and animation that was also used in reviewing traffic operations for each of the options. SimTraffic allowed the review of upstream queuing problems reducing the amount of traffic reaching downstream intersections.

The following analyses were conducted:

- Signalized and Unsignalized Intersection Analysis
- Critical Turn Movements
- Arterial Analysis
- Vehicle Queue Lengths
- Screenline Analysis of Downtown Neighborhoods

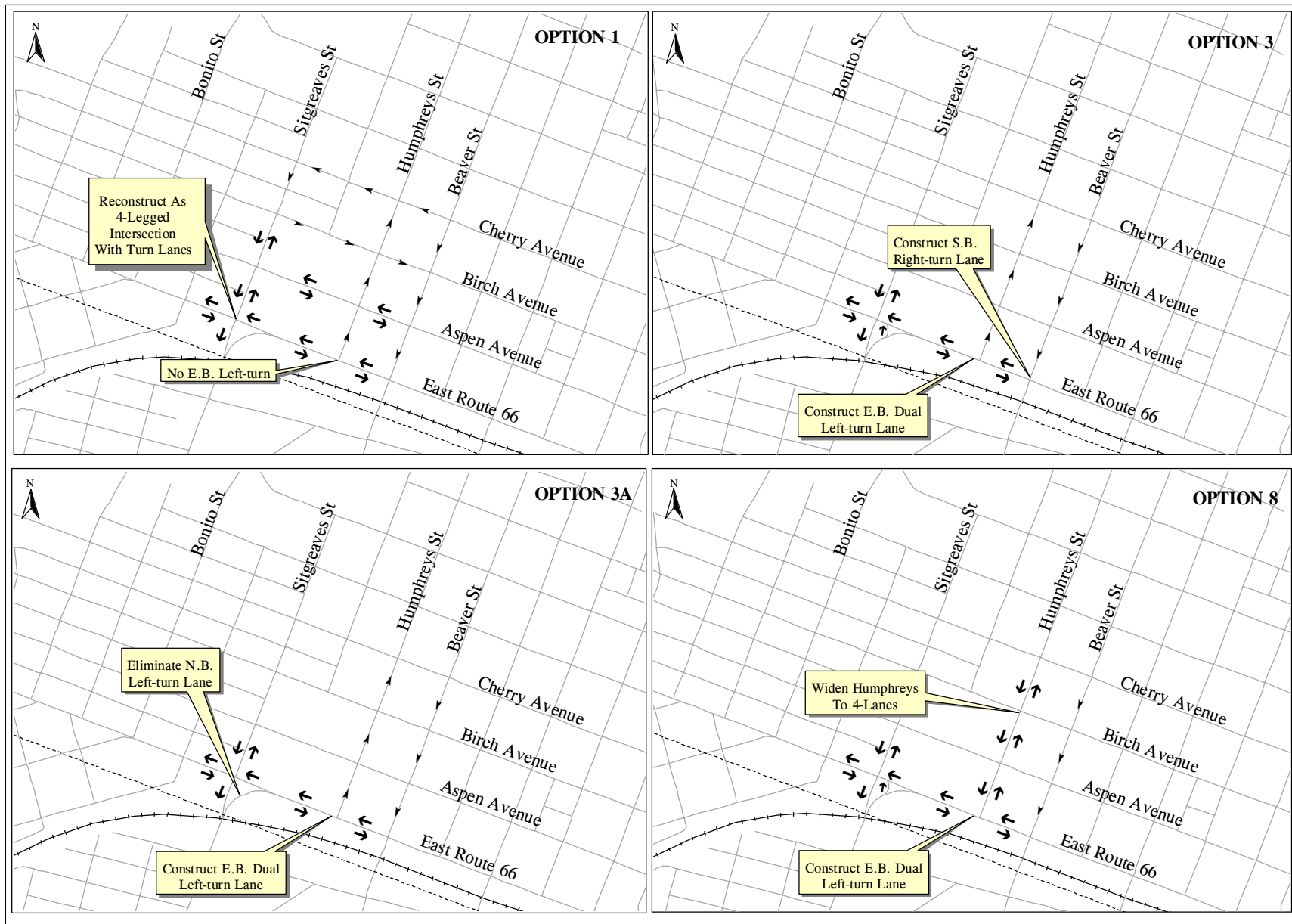
SUMMARY OF FINDINGS OF SECOND SCREENING

The following is a summary of results of the second screening evaluation documented in the *Draft Working Paper: Analysis of Downtown Options* dated December 12, 2002. Figure 24, towards the end of the chapter, presents the second screening options. Two new options were added during the second screening, options 3a and 8, for a total of four improvements options. All the options were compared against the 2020 Base Option, which includes the transportation improvements and land use from the adopted RLTP. In addition, the 2020 No Build Option was analyzed to describe the future traffic problems in detail if no transportation improvements are made and no additional modal shift occurs.

2020 No Build Option

- The 2020 No Build Option represents the worst case scenario in the year 2020. The option assumes that the regional street network will not be improved and that no additional shift to alternative modes will occur.
- Without any roadway improvements and with continued growth, the current conditions will worsen. Significant delays are projected to occur at the signalized and unsignalized intersections, as well as decreased arterial operating speeds and

FIGURE 23. SECOND SCREENING OPTIONS



increased travel times. Major portions of Milton Road and significant portions of West Route 66 will be in gridlock, severely restricting traffic traveling north to the East Route 66/Humphreys Street intersection.

- This option will increase vehicular delay, degrade safety, and increase air pollution due to vehicles slowing and idling. Access to the downtown area will be severely restricted. Pedestrians, bicycle, and transit travel will be negatively impacted from the increased congestion.

2020 Base Option (Alternative Package A)

- The 2020 Base Option represents the transportation network and land use proposed by the adopted RLTP. This option assumes a modal shift of four percent from the automobile mode to alternative modes of transportation.
- The 2020 Base Option will maintain traffic levels of service at about the current levels due to the proposed transportation improvements and modal shift. However, the analysis indicates that the eastbound segment between Butler Avenue and Humphreys Street will deteriorate from the current LOS C to LOS E in 2020.
- Traffic queuing problems will also continue for the eastbound left-turn lane at the East Route 66/Humphreys Street intersection. These eastbound left-turning vehicles queue beyond the provided single left-turn storage bay, blocking the mainline traffic. The analysis also indicates that safety along East Route 66 between the BNSF Railroad Bridge and Humphreys Street will not improve since the bottleneck condition remains due to the eastbound left turns at the East Route 66/Humphreys Street intersection.

Option 1. New Sitgreaves/Santa Fe Intersection with Birch Cherry One-way Loop

- This option reconstructs the Sitgreaves/Santa Fe intersection as a full four-legged intersection permitting all movements at the intersection. Westbound traffic on East Route 66 would move through the intersection while eastbound traffic would continue to traverse the existing curve to Humphreys Street. Northbound traffic to Humphreys Street would travel through the intersection to one-way Birch Avenue via Humphreys Street. Southbound traffic would travel westbound on one-way Cherry Avenue and then south on Sitgreaves Street. Humphreys Street would be one-way northbound from East Route 66 to Cherry Avenue.
- The results indicate that the levels of service are not projected to change much at any of the intersections with the network changes in this option. Also, arterial speeds are similar to the base option. The new signalized intersection at Sitgreaves Street and Santa Fe Street is estimated to operate at an overall level of service B with the westbound and northbound left-turn movements operating at level of service D.
- Southbound Sitgreaves Street between Santa Fe Street and Milton Road carries additional traffic. Northbound traffic is dispersed onto Sitgreaves Street rather than

funneled through the Humphreys Street intersection and also dispersed through the neighborhood north of Aspen Avenue.

- This option requires major reconstruction of the Sitgreaves Street/Santa Fe Avenue intersection involving major constructability issues. Right-of-way may be required for the intersection as well as along Sitgreaves Street, Birch Avenue, and Cherry Avenue. In addition, the implementation of the option has potential federal Section 4f impacts in regard to the Milligan House, Library, and Wheeler Park.

Option 3. Humphreys-Beaver One-way Pair

- Option 3 converts Humphreys Street to one-way northbound and maintains Beaver Street as one-way southbound. A dual left-turn lane would be constructed for the eastbound left-turn lane at the East Route 66/Humphreys Street intersection. The existing northbound left-turn lane at Sitgreaves Street would remain.
- The eastbound dual left-turn lanes on East Route 66 at Humphreys Street improve traffic operations for this movement, eliminating the severe queuing for these left-turning vehicles and blocking of the mainline vehicles. However, the intersection will experience some increased delay over the base option at the intersection of East Route 66/Humphreys Street due to the increased westbound through traffic from the new one-way pair.
- Increased vehicle storage lengths will need to be provided on the dual southbound right-turn movement on Beaver Street and East Route 66 to accommodate the increased traffic from the new one-way pair.
- The construction of the dual left-turn lane would require maintenance of traffic along East Route 66 and on Humphreys Street during construction.

Option 3a. East Route 66 Without Left-turn Lane at Sitgreaves

- This option has the same physical condition as Option 3 except the northbound left-turn lane at Sitgreaves Street is eliminated and the left-turn volumes redistribute to the eastbound left-turn movement at the Humphreys/East Route 66 intersection.
- The increased eastbound left-turn movements on East Route 66 at Humphreys from the closure of the left-turn movements at Sitgreaves Street degrades traffic operations at the East Route 66/Humphreys Street intersection and also at Humphreys Street/Aspen Avenue due to the diversion of traffic from the Sitgreaves left-turn lane.
- Travel patterns would be changed in the area requiring traffic desiring to go north on Sitgreaves and west on Santa Fe Avenue to take a circuitous route through the East Route 66/Humphreys Street intersection.

Option 8. Two Lanes Northbound and Southbound on Humphreys Street

- This option retains the existing four-lane East Route 66, but adds an eastbound dual left-turn lane at the East Route 66/Humphreys Street intersection. To accommodate the traffic turning from the dual left-turn lane, Humphreys Street would be widened from East Route 66 to Birch Avenue, and transition to one lane northbound at Cherry Avenue (Note that further analysis indicated that adding a southbound lane on Humphreys Street from Aspen Avenue to East Route 66 would improve traffic operations).
- The vehicular movement from East Route 66 to Humphreys Street and the access to the downtown area via Humphreys Street will be improved. This option will have minimal impacts on Downtown Streets other than on Humphreys Street.
- This option improves the northbound arterial level of service on East Route 66 from the BNSF Railroad Bridge to Beaver Street. With the improvement, the arterial level of service on this segment is improved from LOS E to LOS C.
- Additional right-of-way is required along the east and west sides of Humphreys Street impacting the proposed redevelopment area.

DETAILED ANALYSIS OF SECOND SCREENING OPTIONS

2020 No Build Option

The 2020 No Build Option is based on using the 2020 forecasted socioeconomic data with the existing 2000 roadway network. No reduction in modal shift from automobile trips to other modes was assumed for the 2020 No Build Option in order to evaluate the worst case scenario.

Signalized Intersection Analysis

As mentioned above, the existing 2000 roadway network was utilized with 2020 land use forecasts. With no improvements to the roadway network and continued growth, the current conditions will worsen. Table 14 provides a summary comparison with the various alternatives including the 2020 No Build Option. As is indicated on Table 14, the overall intersection LOS decreases for the 2020 No Build Option.

Critical Turn Movements

As shown in Table 15, critical turn movements for signalized intersections within the study area include two movements at the East Route 66/Humphrey's Street intersection. The southbound left-turn movement operates at LOS D and the eastbound left-turn movement operates at LOS F.

Unsignalized Intersection Analysis

Similar to the signalized intersections, significant delays are projected to occur at the unsignalized intersections. Table 16 presents a summary of critical movements at the unsignalized intersections in the downtown area. For the 2020 No Build Option, the critical movements that were identified as LOS 'D' or worse indicate severe delays, particularly for the westbound movement on Cherry Avenue at Humphreys Street and also on the eastbound movement on Cherry Avenue at Beaver Street.

Arterial Analysis

Significant delays are projected along the entire roadway network without additional roadway improvements. As Table 17 illustrates, arterial speeds are generally lower for 2020 No Build Option compared to the other options. For example, the eastbound movement between Butler Avenue and Humphreys Street indicates the arterial operating speed to drop from 10.6 mph in the 2020 Base Option to 5.5 mph in the 2020 No Build Option without providing any regional traffic improvements.

Vehicle Queue Lengths

At the intersection of East Route 66 and Humphreys Street, traffic operations for the eastbound left turn are to be further compounded from current operations. The eastbound left turn at this intersection is projected to exceed 680 feet of vehicle queuing as shown in Table 18. Inspection of the traffic simulation, using SimTraffic, for the entire network reveals that downstream intersection and arterial traffic is so backed up that the northbound traffic is severely restricted preventing traffic flow to the East Route 66/Humphreys Street intersection.

Screenline Analysis

In comparing the 2020 No Build Option with the 2020 Base Option, all of the screenlines (Figure 24) show an increase in traffic flows due to no roadway improvements as shown in Table 19. The 2020 Base Option provides roadway network improvements that allow other travel route choices such as the Lone Tree overpass east of the downtown area. This is evident with the significant increase in traffic along screenline 2 with the 2020 No Build scenario.

2020 Base Option

The traffic results for the alternative options are compared with the 2020 Base Option. This option is the 2020 Base Option multimodal package that includes the land use and transportation improvements from the *Flagstaff Land Use and Transportation Plan*. The 2020

Base Option assumes a four percent modal shift from automobile trips to other modes such as the transit, pedestrian, and bicycle modes by the year 2020. The traffic measures for the 2020 Base Option are reported in the discussion for each option as well as in summary tables.

In review of the simulation for the 2020 Base Option, queues are projected on the eastbound left turns on East Route 66 at Humphreys Street and also for the southbound left turns on Humphreys Street at East Route 66. Further, the eastbound left turns at Humphreys Street on East Route 66 queue beyond the provided left-turn storage bay and block the inner eastbound through lane. As can be seen from Table 18, the 2020 Base Option shows the most severe queue lengths for the eastbound left turn at East Route 66 and Humphreys Street as compared to all of the other options. In addition, from the simulation, the southbound movement on Humphreys Street at East Route 66 shows vehicular queuing back beyond Cherry Avenue.

Screenline Analysis

In order to evaluate changes in traffic flows along parallel roadway facilities, five screenlines were developed at several locations in the downtown area. Figure 24 illustrates the screenline locations and screenline number. Forecasted daily traffic volumes were summarized across each screenline as shown in Table 19.

Option 1. New Sitgreaves Street/Santa Fe Avenue Intersection with Birch-Cherry One-way Loop

Signalized Intersection Analysis

Option 1 provides a one-way, two-lane, eastbound connection from Sitgreaves Street to the east. A new traffic signal will be installed at the Sitgreaves Street/Santa Fe Avenue intersection with two through lanes both northbound and southbound through the intersection. The westbound to southbound left-turn volume is projected to be very high because all traffic that currently travels westbound then southbound on East Route 66 is diverted through the Sitgreaves Street/Santa Fe Avenue intersection with this option. Dual left-turn lanes will be provided at the intersection for the westbound to southbound movement. The other significant change with this option is that eastbound to northbound left turns on East Route 66 will not be allowed at Humphreys Street.

The results of the signalized intersection capacity analyses for Option 1 are shown on Table 14. Synchro was allowed to optimize the signal timing and phasing for these analyses throughout the entire network in order to optimize traffic operations and minimize delay on the entire network. The results indicate that levels of service are not projected to change much at most of the intersections with the network changes in this option. The intersection level of service at Humphreys Street and Aspen Avenue indicates that with Aspen Avenue east of Humphreys Street converted as a two-way facility, the intersection decreases to a LOS 'C'.

Critical Turn Movements

Table 15 presents a summary of the critical turning movements at the signalized intersections. The level of service shown is for turning movements that exhibit LOS 'D' or worse. Although acceptable levels of service are projected overall at the signalized intersections, two movements are projected to be LOS 'D' and 'E'. Those movements are the westbound and northbound left-turn movements respectively, at the intersection of Sitgreaves Street and Santa Fe Avenue.

Unsignalized Intersections

The results of the critical movements at the unsignalized intersections in the downtown area are shown below in Table 16. With the roadway changes in this option, the intersection of Humphreys Street and Cherry Avenue no longer has any eastbound traffic. The critical movement at this intersection is now the westbound through movement, which is projected to operate at LOS 'C' with associated approach delay of 24.8 seconds per vehicle. The westbound critical movement at the intersection at Beaver Street and Cherry Avenue is projected to decrease in delay, while remaining at a level of service 'D'.

Arterial Analysis

The arterial speeds for Option 1 are summarized in Table 17. Overall, Option 1 does not provide considerable improvement to the arterial speeds over the condition found in the 2020 Base Option. In fact, the arterial speed along Humphreys Street between East Route 66 and Aspen Avenue is decreased. This decrease in arterial speed is due to Aspen Avenue east of Humphreys Street being converted as a two-way facility with subsequent increased intersection delay at Humphreys Street and Aspen Avenue. However, the traffic operations do improve between Humphreys Street and Beaver Street along East Route 66, since the northbound left turn at Humphreys Street is no longer permitted.

Vehicle Queue Lengths

Dual left-turn lanes have been modeled for both major movements at Sitgreaves Street/Santa Fe Avenue intersection and 350 feet of storage has also been provided. These movements are the northbound to westbound and eastbound to southbound. The SimTraffic simulation reveals that no queuing or backing problems occur beyond the 350 feet of storage provided for either movement. Table 18 provides a summary of the queue lengths at critical locations.

Screenline Analysis

In comparing Option 1 to the 2020 Base Option, slight decreases exist across screenlines 1, 2, 4, and 8, see Table 19. Screenline 7, which crosses Cherry, Birch, and Aspen Avenues west of Humphreys Street, shows an increase of nearly 5,000 daily vehicles as compared to the 2020 Base Option since traffic is diverted north along Sitgreaves Street. Screenline 8 located parallel north of Cherry Avenue did not increase since the rerouting of traffic has occurred south of this screenline. In addition, Screenline 9 which crosses west of Sitgreaves Street, indicates a 40 percent increase in traffic flow as compared to the 2020 Base Option.

Option 3. Humphreys-Beaver One-way Pair

Signalized Intersection Analysis

Option 3 provides a one-way, two-lane couplet configuration with Humphreys Street (US 180) carrying northbound traffic and Beaver Street carrying southbound traffic. The eastbound to northbound movement will have dual left-turn lanes and the southbound right turn from Beaver Street will have dual right-turn lanes. The other change with this option is that Columbus between Beaver Street and Humphreys Street is now two lanes in each direction.

The results of the signalized intersection capacity analyses for Option 3 are shown on Table 14. The results indicate that Option 3 will actually experience increased delay over the 2020 Base Option at the intersection of East Route 66 with Humphreys Street, levels of service are projected to be 'C'. This is due to the increased westbound through traffic at Humphreys Street opposing the dual eastbound left-turn lane movement.

Critical Turn Movements

Table 15 presents a summary of the critical turning movements at the signalized intersections for turning movements that exhibit LOS 'D' or worse. Although acceptable levels of service are projected overall at the signalized intersections, the improved signalized intersection of East Route 66 and Humphreys Street indicate that the dual left-turn lanes on the eastbound left turns are projected to be LOS 'E'.

Unsignalized Intersection Analysis

The results of the unsignalized intersections for this option are shown in Table 16 and indicate that Option 3 slightly improves the delay of the critical movement at the intersection of Humphreys Street and Cherry Avenue. However, the critical movement at the intersection of Beaver Street and Cherry Avenue decreases to a LOS 'F'.

Arterial Analysis

Table 17 shows that the arterial speeds along East Route 66 are projected to improve for the eastbound movement between Humphreys Street and Beaver Street. This is due to the modification of Humphreys Street as a one-way northbound that subsequently reduces eastbound traffic along this segment. The overall arterial speeds of Humphreys will be approximately the same as the 2020 Base Option.

Vehicle Queue Lengths

The southbound dual right-turn movement on Beaver Street at East Route 66 is projected to operate at LOS 'B' during the peak hour, but approximately 270 feet of storage will need to be provided. Even with this length of storage, the traffic simulation shows that vehicles trying to get into one of the right-turn lanes may back the southbound through traffic.

As shown in Table 18, the eastbound left-turn movement on East Route 66 at Humphreys Street with 350 feet of dual left-turn storage being provided meets the average and maximum vehicle queue length. In watching the simulation, this movement did not indicate vehicular backing problems on East Route 66 for the eastbound left turn at Humphreys Street.

Screenline Analysis

Screenlines 1, 2, 7, and 8 as shown in Table 19, show a slight decrease in traffic flows as compared to the 2020 Base Option. Screenlines 4 and 9 increase slightly by over 1,000 and 2,000 vehicles per day, respectively. These slight changes in traffic flow are due to rerouting of vehicles with the one-way couplets of Humphreys Street and Beaver Street.

Option 3a. East Route 66 Without Left-turn Lane at Sitgreaves

Signalized Intersection Analysis

A modification to Option 3 was the elimination of the eastbound to northbound left-turn movement from East Route 66 to travel to Sitgreaves Street, as identified as Option 3a. This modification to the network was made because of the high incidence of these left-turning vehicles blocking the through traffic in the innermost eastbound lane on East Route 66, heading eastbound and eventually turning left at Humphreys Street. The left-turn volume on this link was re-assigned and added to the left-turn volume at Humphreys Street, and capacity analyses were conducted to determine any differences to the network. The results of the signalized intersection capacity analyses for the intersections directly affected by this change are shown in Table 14.

The results indicate that the only two intersections adversely affected by this change are the intersections of Humphreys Street with East Route 66 and with Aspen Avenue, which is the first signalized intersection to the north. The increased left-turning volume at these two intersections affects not only the left-turn delay, but also the overall intersection delay. Although the overall intersection at Humphreys Street and East Route 66 is projected to operate at LOS 'C' as shown in Table 14, the left-turn movement at Humphreys Street is now projected to operate at LOS 'E' with associated delay for that movement being more than 60 seconds per vehicle (Table 15). The entire eastbound approach is now projected to operate at LOS 'D' with this roadway change.

Critical Turn Movements

Critical turn movements at signalized intersections were identified for this option as shown in Table 15. As mentioned above, the only critical turning movement was for the eastbound left turn on East Route 66 at Humphreys Street with a projected LOS 'E'.

Unsignalized Intersection Analysis

Critical movements are the same as in Option 3, see Table 16.

Arterial Analysis

As shown in Table 17, the segment on Humphreys Street between East Route 66 and Aspen Avenue is projected to deteriorate due to the additional traffic diverted to Humphreys Street by eliminating the left-turn movement at East Route 66/Sitreaves Street.

Vehicle Queue Lengths

The 350 feet of left-turn storage being provided for the eastbound left turn on East Route 66 at Humphreys Street is reported to be at the maximum vehicle queue as can be seen in Table 18. This is due to the elimination of the left-turn link to Sitgreaves Street; therefore, increasing the demand of eastbound left turns at Humphreys Street. In watching the simulation, queues develop from the northbound approach at the intersection of Aspen Avenue and Humphreys Street and subsequently backup to East Route 66. In addition, this compounds the eastbound left turns at Humphreys Street in queuing vehicles beyond the 350 feet of storage length blocking the eastbound through lane.

The southbound left turns on Beaver Street at East Route 66 as seen in the simulation back up beyond the storage length of 100 feet. This is also indicative of the maximum queue length of 144 feet as shown in Table 18.

Screenline Analysis

Although a separate traffic forecast was not conducted for Option 3a, the traffic flows across the screenlines will be generally similar to Option 3, since left-turning traffic is rerouted. However, Screenline 7 would have an increased amount of traffic as compared to the 2020 Base Option, since the rerouted traffic would travel north along Humphreys Street then travel back west along Aspen, Birch, or Cherry Avenues.

Option 8. Two Lanes Northbound and Southbound on Humphreys Street

Signalized Intersection Analysis

This alternative modified the 2020 Base Option by changing Humphreys Street between East Route 66 and Aspen Avenue to include two lanes in each direction from East Route 66 to Birch Avenue. This also included dual left-turn lanes eastbound to northbound at Humphreys Street. The two lanes would be transitioned out north of Aspen Avenue, but for modeling purposes, the two through lanes were carried north up to Birch Avenue. The results of the signalized intersections directly affected by these changes are shown in Table 14. The results of the signalized intersection analyses indicate that this option provides the same levels of service as the 2020 Base Option, but slightly higher intersection delays.

Critical Turn Movements

Critical turn movements at signalized intersections were identified for this option as shown in Table 15. The only critical turning movement was for the eastbound left-turn movement at Humphreys Street, projected to operate at LOS 'E'.

Unsignalized Intersection Analysis

As shown in Table 16, the westbound critical movement at the Humphreys/Cherry unsignalized intersection is operating at LOS F.

Arterial Analysis

Option 8 improves East Route 66 eastbound arterial operations from that of the 2020 Base Option. Between Butler Street and Humphreys Street, the arterial speed will increase from 10.6 mph to 17.5 mph, greater than 60 percent (See Table 17). In addition, Beaver Street will also experience a slight operational improvement with this option.

Vehicle Queue Lengths

As indicated on Table 18, the eastbound left-turn queues on East Route 66 are projected to be within the storage capacity of 350 feet. The southbound left- and right-turn queue lengths on Beaver Street at East Route 66 indicate longer queues than the provided storage lengths for the simulated maximum queue. The traffic simulation for this option does not show areas of heavy congestion or delay.

Screenline Analysis

Screenlines for Option 8 are the same for the 2020 Base Option as shown in Table 19. Since Option 8 is improving traffic operations along Humphreys Street and at the intersection of East Route 66, traffic flows across the screenlines will have no anticipated changes in vehicle rerouting.

DOWNTOWN CRASH ANALYSIS

A crash analysis was conducted for the area between Butler Avenue and Humphreys Street. Crash data obtained for the Flagstaff Urban Mobility Study (FUMS) *Working Paper: Existing Conditions*, September 11, 2001, was reviewed along Milton Road/East Route 66 between Butler Avenue and Humphreys Street.

Figure 25 depicts the number of crashes for both the intersections and roadway sections between Butler Avenue and Humphreys Street. Table 20 presents the existing crash collision manner for the intersections. ADOT intersection crash information does not have the level of detail to identify the left-turn movement for Sitgreaves Street. In addition, the intersection crash data is not provided by direction. There also were many non-intersection crashes identified along Milton Road/East Route 66 between Butler Avenue and Humphreys Street. Table 21 presents the collision manner along this section of roadway for non-intersection crashes.

Approximately 69 percent of the intersection crashes between Butler Avenue and Humphreys Street were rear-end crashes. Over 90 percent of the intersection crashes between the BNSF Railroad Bridge and Humphreys Street involved rear-end collisions (not shown in Table 20).

In the segment between Butler Avenue and Humphreys Street, more than 94 percent of the crashes in both directions were rear-end accidents. Over 60 percent of the segment crashes between the left-turn lane at Sitgreaves and the Humphreys Street intersection were rear-end collisions in the eastbound direction (not shown in Table 20). These crash patterns are most likely attributed to the queuing problems associated with the left turns at Sitgreaves Street, eastbound to northbound operations at the East Route 66/Humphreys Street intersection, and resulting traffic congestion in this area.

**TABLE 14. SUMMARY OF SIGNALIZED INTERSECTIONS
LEVEL OF SERVICE AND DELAY – MID-DAY HOUR**

Intersection Location	2020 Base Option		2020 No Build Option		Option 1		Option 3		Option 3a		Option 8	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Milton/Butler/Clay	C	20.7	E	72.5	C	27.0	C	30.5	C	30.1	C	23.7
Sitgreaves/Santa Fe	-	-	-	-	C	31.2	-	-	-	-	-	-
East Route 66/Humphreys	B	17.2	C	32.8	A	0.0	C	21.5	C	28.0	B	19.0
East Route 66/Beaver	B	13.7	C	20.1	B	16.6	B	12.8	B	14.5	B	15.7
Humphreys/Aspen	A	2.6	A	7.0	C	17.6	A	5.8	A	7.8	A	2.9
Humphreys/Birch	A	5.6	A	10.0	A	3.7	A	4.2	A	4.2	A	3.8
Beaver/Aspen	A	4.6	A	5.8	A	6.6	A	3.8	A	5.3	A	3.7
Beaver/Birch	A	9.9	B	10.6	A	2.1	A	3.4	A	4.4	A	9.9

**TABLE 15. SUMMARY OF CRITICAL SIGNALIZED INTERSECTION TURN MOVEMENTS
LEVEL OF SERVICE D OR WORSE - MID-DAY HOUR**

Downtown Option	Signalized Intersection	Movement	Level of Service
2020 No Build Option	East Route 66/ Humphreys	Southbound Left	D
		Eastbound Left	F
2020 Base Option	East Route 66/ Humphreys	Southbound Left	D
Option 1	Santa Fe/Sitgreaves	Westbound Left	D
		Northbound Left	E
Option 3	East Route 66/Humphreys	Eastbound Left	E
Option 3a	East Route 66/Humphreys	Eastbound Left	E
Option 8	East Route 66/Humphreys	Eastbound Left	E

**TABLE 16. SUMMARY OF CRITICAL MOVEMENTS AT UNSIGNALIZED INTERSECTIONS
LEVEL OF SERVICE AND DELAY - MID-DAY HOUR**

Intersection Location Critical Movement	2020 Base Option		2020 No Build Option		Option 1		Option 3		Option 3a		Option 8	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Humphreys/Cherry												
Eastbound	F	114.4	E	42.9	-	-	E	38.7	E	38.7	F	114.4
Westbound	D	30.9	F	222.4	C	24.8	D	29.6	D	29.6	F	54.7
Beaver/Cherry												
Eastbound	D	31.0	F	507.3	-	-	D	31.0	D	31.0	D	34.5
Westbound	D	34.5	F	94.5	D	29.6	F	55.7	F	55.7	D	27.7

TABLE 17. COMPARISON OF ARTERIAL SPEEDS (MPH) BY DOWNTOWN OPTION- MID-DAY HOUR

Arterial Segment	Northbound						Southbound					
	Base	No Build	Option 1	Option 3	Option 3a	Option 8	Base	No Build	Option 1	Option 3	Option 3a**	Option 8
Humphreys(US 180)												
East Route 66 – Aspen	22.9	20.8	17.8	19.9	11.1	20.3	6.5	4.4	-	-	-	7.2
Aspen – Birch	18.3	14.2	20.6	21.4	13.6	18.9	19.2	18.8	-	-	-	20.6
Birch – Cherry	-	-	-	-	-	-	22.5	16.6	-	-	-	23.4
Beaver												
East Route 66 – Aspen	-	-	-	-	-	-	6.8	5.5	7.9	9.8	9.8	7.3
Aspen – Birch	-	-	-	-	-	-	20.8	18.1	25.3	18.6	18.6	20.9
Birch – Cherry	-	-	-	-	-	-	20.8	16.1	22.4	22.9	22.9	22.8
	Eastbound						Westbound					
East Route 66												
Butler – Sitgreaves*	10.6	5.5	14.7	12.5	12.5	16.2	14.1	15.3	20.3	15.9	15.9	17.5
Sitgreaves - Humphreys			23.2						10.9			
Humphreys – Beaver	8.0	6.9	7.7	20.7	25.4	8.3	9.6	4.8	23.2	10.6	8.8	9.7

*Segment is from Butler to Humphreys street for all options except option 1

**Values are assumed the same as option 3

TABLE 18. SUMMARY OF VEHICLE QUEUING - MID-DAY HOUR

Intersection Movement	2020 Base Option			2020 No Build Option			Option 1			Option 3			Option 3a			Option 8		
	Storage Length (ft)	Avg (ft)	Max (ft)	Storage Length (ft)	Avg (ft)	Max (ft)	Storage Length (ft)	Avg (ft)	Max (ft)	Storage Length (ft)	Avg (ft)	Max (ft)	Storage Length (ft)	Avg (ft)	Max (ft)	Storage Length (ft)	Avg (ft)	Max (ft)
Sitgreaves/Santa Fe- WB Left	-	-	-	-	-	-	350	193	229	-	-	-	-	-	-	-	-	-
Sitgreaves/Santa Fe- NB Left	-	-	-	-	-	-	350	69	104	-	-	-	-	-	-	-	-	-
East Route 66/Beaver- SB Right	215	239	241	215	106	196	200	84	111	215	241	269	215	233	251	215	127	227
East Route 66/Beaver- SB Left	100	80	127	100	64	112	200	162	224	215	190	240	100	129	144	100	120	125
East Route 66/Humphreys- SB Left	175	197	200	175	121	192	-	-	-	-	-	-	-	-	-	375	100	184
East Route 66/Humphreys- EB Left	350	306	365	350	467	681	-	-	-	350	172	244	350	242	350	350	157	222
Aspen/Humphreys- NB Left	75	55	89	75	29	56	75	31	72	75	14	46	75	82	100	75	30	100
East Route 66/Left Turn to Sitgreaves *	125	98	-	125	130	-	-	-	-	125	39	-	-	-	-	125	47	-

Note: The queue lengths for the 2020 No Build Option are reported from the Synchro software. However, the traffic simulation indicates that queuing is not a problem at the East Route 66 eastbound left-turn lane. This is a result of traffic clogging the intersections and arterials downstream.

*This movement is not signalized and is reported from the Synchro software as “queue length.”

TABLE 19. COMPARISON OF DAILY SCREENLINE VOLUMES IN DOWNTOWN AREA

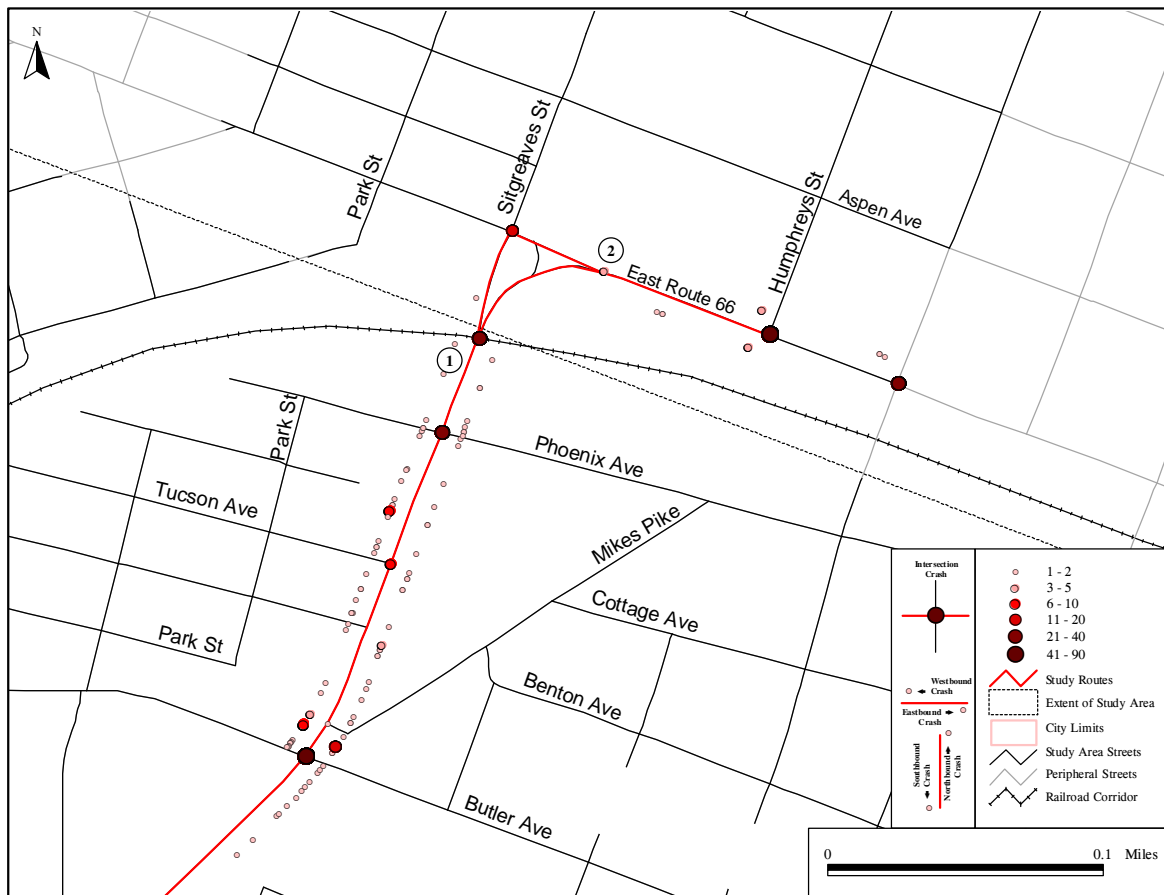
Screenline	2020 Base Option	2020 No Build Option	Option 1	Option 3	Option 8
1	52.0	56.9	51.9	50.3	52.0
2	58.0	86.5	56.8	56.8	58.0
4	8.7	12.5	6.1	10.0	8.7
7	7.6	9.9	12.3	7.3	7.6
8	44.8	48.2	43.0	42.1	44.8
9	10.5	12.8	14.7	12.6	10.5

Note: Daily traffic volumes in thousands

FIGURE 24. SCREENLINES IN DOWNTOWN AREA



FIGURE 25. NUMBER OF TOTAL CRASHES - BUTLER AVENUE TO HUMPHREYS STREET (DECEMBER 1997 - DECEMBER 2000)



(#) See Table 20

TABLE 20. INTERSECTION CRASH COLLISION MANNER BETWEEN BUTLER AVENUE AND HUMPHREYS STREET

Collision Manner	Angle	Left Turn	Rear End	Single Vehicle	Total	Percent of Total
Humphreys/East Route 66	10	14	24	7	55	25.82%
East Route 66/Santa Fe (2)	1	1	3	0	5	2.35%
East Route 66/Sitgreaves (1)	1	0	35	1	37	17.37%
Phoenix/Route 66	6	2	18	2	28	13.15%
Tucson/Route 66	2	0	3	0	5	2.35%
Mikes Pike/Route 66	0	0	0	1	1	0.47%
Butler/Route 66	3	8	63	8	82	38.50%
Total	23	25	146	19	213	100.00%
Percent of Total	10.80%	11.74%	68.54%	8.92%	100.00%	

(#) See Figure 25

**TABLE 21. ROADWAY SECTION CRASH COLLISION MANNER EAST ROUTE 66
BETWEEN BUTLER AVENUE AND HUMPHREYS STREET**

Collision Manner	Number of Crashes	Percent of Total
Backing (EB)	2	2.27 %
Backing (WB)	3	3.41 %
Rear-End (EB)	44	50.00 %
Rear-End (WB)	39	44.32 %
Total	88	100.00 %

RELATIONSHIP BETWEEN SAFETY AND TRAFFIC CONGESTION

Existing queue lengths on eastbound Milton Road/East Route 66 between Butler Avenue and Humphreys Street become long during various peak periods of the day. This traffic queuing is due to traffic backing up beyond the available storage length of the eastbound left-turn lane at the East Route 66/Humphreys intersection. The queue length on this segment west of Humphreys Street has been recorded as high as 27 standing vehicles during the mid-day peak hour, equivalent to approximately 675 feet. Since the existing storage length of the eastbound left-turn lane is 350 feet, vehicles back up in the eastbound left through lane for approximately 500 feet (approximately 20 vehicles). In addition, traffic making a left turn onto Sitgreaves Street from Milton Road/East Route 66 is also blocked by the queuing traffic causing further queuing reaching south of the BNSF Railroad Bridge and affecting northbound traffic as far as Butler Avenue.

Although it is difficult to quantitatively correlate the relationship of the queuing traffic to the number and type of crashes, the following conclusions can be drawn from relating the crash analysis to the queuing problem.

- The crash analysis indicated that there is a very high number of rear end crashes in the relatively short segment of eastbound Milton Road/East Route 66 between Butler Avenue and Humphreys Street. The crash analysis also indicated that the Southbound Milton Road/East Route 66 has a high number of rear end accidents.
- Rear-end crashes are associated with stop-and-go traffic, left-turning vehicles, and vehicles making lane changes, all related to traffic queuing. Therefore, traffic queuing is a highly likely cause of the rear-end crashes.
- A visual review of the non-intersection related crash reveals an almost continuous stream of crashes in both the northbound and southbound directions of Milton Road/East Route 66 north of Butler Avenue. Since the large majority of these crashes are rear-end crashes, this supports the conclusion that crashes are related to the queuing traffic occurring on this segment.

A clear conclusion based on the above analysis is that the elimination of the traffic queuing problem on both northbound and southbound Milton Road/East Route 66 between Butler Avenue and Humphreys Street will improve safety downstream from where the queuing problem originates.

SECOND SCREENING RESULTS – ANALYSIS OF IMPACTS

This section presents the impact analysis for options that were carried to the second screening. Impacts were evaluated for the following categories for each of the options: vehicular operations, safety, cost, right-of-way requirements, pedestrian movement, constructability issues, environmental, and social and political acceptance. Impacts are described in detail for each option and ranked on a scale of -3 to +3, with a -3 indicating a high negative impact and a +3 indicating a high positive impact. The impact ratings are summarized in Table 22.

2020 NO BUILD OPTION

Vehicular Operations:	<ul style="list-style-type: none">- Traffic volumes throughout the network are blocked at intersections and on the arterials.- The highway network south of the Railroad Bridge will reach gridlock severely limiting traffic flow to the north.- Level of service on northbound East Route 66 will degrade to low level of service F.- Access to the downtown area will be severely restricted.
Cost:	<ul style="list-style-type: none">- No new construction cost.
Environmental:	<ul style="list-style-type: none">- Air quality will degrade.- Noise levels will increase.
Constructability:	<ul style="list-style-type: none">- No constructability issues.
Social/Political Acceptance:	<ul style="list-style-type: none">- Severe congestion and bottleneck on Milton Route and East Route 66 as well as throughout the network could be socially and politically unacceptable.
Pedestrian:	<ul style="list-style-type: none">- The increased traffic could make crossing East Route 66 and Humphrey's Street difficult for pedestrians.

2020 BASE OPTION

Vehicular Operations:	- The bottleneck problem on Eastbound 66 between the Railroad Bridge and Humphreys Street will continue.
Cost:	- No additional cost will be incurred in downtown area.
Environmental:	- Increased air pollution and fuel consumption due to congestion.
R-O-W:	- No R-O-W impacts in downtown area.
Constructability:	- No constructability issues.
Social/Political Acceptance:	<ul style="list-style-type: none">- The social and political unacceptance of the continued congestion and bottleneck problem will probably increase.- The continued impeded access to downtown will probably become unacceptable.
Safety:	- Safety will degrade due to increased congestion on East Route 66.
Pedestrian:	- Traffic congestion and bottleneck will impede traffic across East Route 66.

OPTION 1. NEW SITGREAVES/SANTA FE INTERSECTION WITH BIRCH-CHERRY ONE-WAY LOOP

Vehicular Operations:	<ul style="list-style-type: none">- The option requires a new traffic signal at Sitgreaves/Santa Fe intersection.- Southbound on Sitgreaves Street between Santa Fe Street and Milton carries additional traffic.- Northbound traffic is dispersed onto Sitgreaves Street rather than funneled through the Humphreys Street intersection.- Northbound and southbound traffic is dispersed through the neighborhood north of Aspen Avenue.
Cost:	- The construction cost for the reconstruction of the Sitgreaves/Santa Fe intersection will be high.
Environmental:	<ul style="list-style-type: none">- Potential Section 4f impacts of Historical Properties along Sitgreaves Street between Aspen and Cherry Avenues.- New traffic in neighborhoods will generate noise and air pollution in neighborhoods.- Improved traffic operations on East Route 66 will reduce air pollution impacts and reduce fuel consumption along the Route.

R-O-W:	- Additional right-of-way is required for widening on Sitgreaves Street from Santa Fe Street to Birch Avenue.
Constructability:	<ul style="list-style-type: none"> - The option would require the reconstruction of the Sitgreaves/Santa Fe intersection and the segment of East Route 66 from the Railroad Bridge to Humphreys Street. - The reconstruction would require major maintenance of traffic probably necessitating detouring traffic through the downtown and neighborhoods north and south of East Route 66. - Sitgreaves Street from Santa Fe Street to Birch Avenue may need to be widened to accommodate additional traffic. The Milligan House on the southeast corner of Sitgreaves Street/Aspen intersection may be impacted, a house on the National Register of Historic Places.
Social/Political Acceptance:	<ul style="list-style-type: none"> - Social acceptance will be low due to additional traffic through residential neighborhoods and increased noise through residential neighborhoods. - The need to prohibit parking on residential Streets where parking is currently allowed would decrease acceptance. - One-way operation on Humphreys Street may not be politically popular.
Safety:	<ul style="list-style-type: none"> - This option would provide safety between Sitgreaves Street and Humphreys Street with the elimination of the northbound left turns at Sitgreaves Street and the eastbound left turns at Humphreys Street. - Increased traffic through residential neighborhoods may degrade safety in these neighborhoods.
Pedestrian:	<ul style="list-style-type: none"> - Pedestrian traffic in the neighborhood north of Aspen Avenue would be adversely impacted by additional traffic generated by this option. - Pedestrian traffic crossing Humphreys Street may move more easily across the Street due to reduced traffic.

OPTION 3. HUMPHREYS-BEAVER ONE-WAY PAIR

Vehicular Operations:	<ul style="list-style-type: none"> - Dual left-turn lanes eastbound to northbound at East Route 66/Humphreys Street intersection may create improved operations at the northbound left-turn lane at Sitgreaves Street. - Northbound traffic going to US 180, Grand Canyon, is less impeded due to improvement of the eastbound left-turn movement onto Humphreys Street. - Southbound traffic on Humphreys Street will be diverted to Cherry Avenue and to Beaver Street.
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Cost:	<ul style="list-style-type: none">- Moderate cost to construct the eastbound dual left-turn lane at the Humphreys Street/East Route intersection and the southbound right-turn lane at Beaver Street/East Route 66.
Environmental:	<ul style="list-style-type: none">- Improved traffic operations along East Route 66 will reduce air pollution and fuel consumption.
R-O-W:	<ul style="list-style-type: none">- Additional right-of-way required for reconstruction of the northwest corner of East Route 66/Humphreys Street intersection and the southwest corner of East Route 66/Beaver Street.- Although the right-of-way required is relatively expensive because of the downtown location, the total cost and right-of-way needs are minor and associated with the reconstruction of the two intersections only.
Constructability:	<ul style="list-style-type: none">- Reconstruction of the northwest corner of the East Route 66/Humphreys Street intersection and the southwest corner of East Route 66/Beaver Street.- Minor constructability issues due to the existing roadway system and no pavement widening required on Humphreys Street or Beaver Street.
Social/Political Acceptance:	<ul style="list-style-type: none">- The one-way operation on Humphreys Street may not be politically popular.
Safety:	<ul style="list-style-type: none">- Elimination of the eastbound left-turning traffic backing on the eastbound through lanes due to dual left-turn lanes will reduce accidents.
Pedestrian:	<ul style="list-style-type: none">- The crossing width for pedestrians will remain the same as the existing intersection.- The amount of signal time for pedestrians crossing Humphreys Street will not be changed.- Pedestrians crossing Beaver Street will be impacted due to the addition of a southbound right-turn lane.

OPTION 3A. EAST ROUTE 66 WITHOUT LEFT-TURN AT SITGREAVES

Vehicular Operations:	<ul style="list-style-type: none">- Northbound traffic going to US 180, Grand Canyon, is less impeded due to improvement of the eastbound left-turn movement onto Humphreys Street.- Southbound traffic on Humphreys Street will be diverted to Cherry Avenue and to Beaver Street.
Cost:	<ul style="list-style-type: none">- Moderate cost to construct the eastbound dual left-turn lane at Humphreys Street/East Route intersection and the southbound right-turn lane at Beaver Street/East Route 66.
Environmental:	<ul style="list-style-type: none">- Improved traffic operations along East Route 66 will reduce air pollution and fuel consumption.
R-O-W:	<ul style="list-style-type: none">- Additional right-of-way required for reconstruction of the northwest corner of East Route 66/Humphreys Street intersection and the southwest corner of East Route 66/Beaver Street.- Although the right-of-way required is relatively expensive because of the downtown location, the cost and right-of-way needs are minor and associated with the reconstruction of the two intersections only.
Constructability:	<ul style="list-style-type: none">- Reconstruction of the northwest corner of the East Route 66/Humphreys Street intersection and the southwest corner of East Route 66/Beaver Street.- Minor constructability issues due to the existing roadway system and no pavement widening required on Humphreys Street or Beaver Street.
Social/Political Acceptance:	<ul style="list-style-type: none">- The one-way operation on Humphreys Street may not be politically popular.
Safety:	<ul style="list-style-type: none">- Elimination of the eastbound left-turning traffic backing on the eastbound through lanes due to dual left-turn lanes will reduce accidents.
Pedestrian:	<ul style="list-style-type: none">- The crossing width for pedestrians will remain the same as the existing intersection.- The amount of signal time for pedestrians crossing Humphreys Street will not be changed.- Pedestrians crossing Beaver Street will be impacted due to the addition of a southbound right-turn lane.

OPTION 8. TWO LANES NORTHBOUND AND SOUTHBOUND ON HUMPHREYS STREET

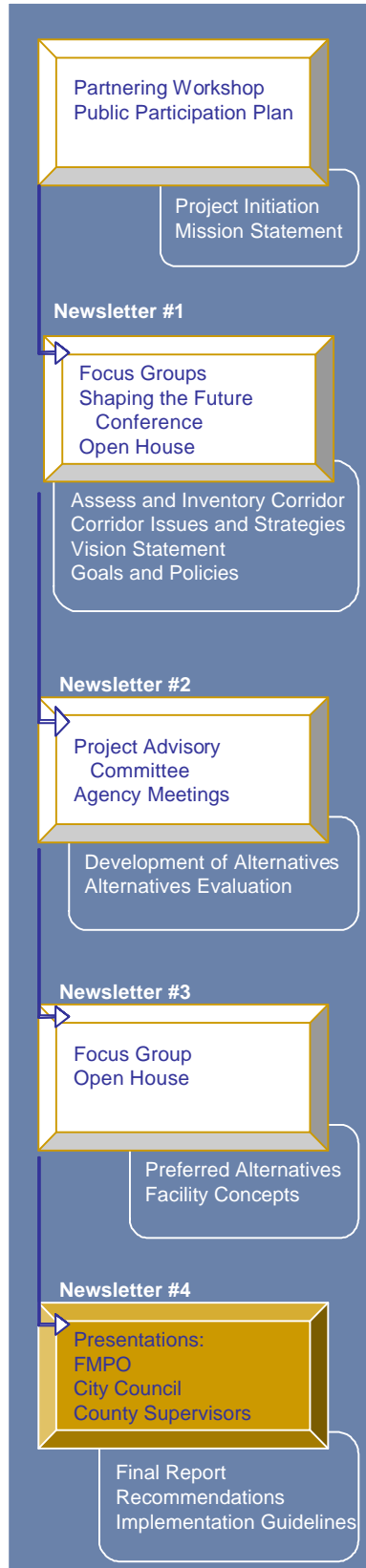
Vehicular Operations:	<ul style="list-style-type: none">- Movement of traffic from East Route 66 to Humphreys Street will be improved.- Access to the downtown area via Humphreys Street will be significantly improved.- Easier access by automobile may encourage more tourists to visit downtown.- Minimal traffic impacts on Downtown Streets other than on Humphreys Street.- The elimination of left-turning traffic backing up at Humphreys will improve vehicle operations.
Cost:	<ul style="list-style-type: none">- Relatively low construction costs.
Environmental:	<ul style="list-style-type: none">- Reduced air pollution and fuel consumption due to reduction in queuing traffic.
R-O-W:	<ul style="list-style-type: none">- Requires additional right-of-way on east side of Humphreys Street.
Constructability:	<ul style="list-style-type: none">- The maintenance of traffic during construction of dual left-turn lane will slow traffic on East Route 66 during construction. Traffic may need to be detoured through the downtown area.
Social/Political Acceptance:	<ul style="list-style-type: none">- The public is likely to accept the maintenance of two-way operation on Humphreys Street. Also, this option would accommodate the elimination of one-way streets in the Downtown if the City elects to do so in the future.- This option should be politically acceptable due to the minimal impacts on traffic, businesses, and residential properties.
Safety:	<ul style="list-style-type: none">- The elimination of the eastbound left-turning traffic back up at the Humphreys Street/East Route 66 intersection will reduce accidents.
Pedestrian:	<ul style="list-style-type: none">- Pedestrian impacts crossing Route 66/Humphreys Street intersection.

TABLE 22. DOWNTOWN ALTERNATIVES EVALUATION – SECOND SCREENING

Impact	Option 1	Option 3	Option 3a	Option 8
Vehicular Operations	3	1	-1	2
Cost	-2	-1	-1	-1.5
Environmental	-3	1	1	1
R-O-W	-2	0	0	-1
Constructability	-2	1	1	1
Social/Political Acceptance	-3	-2	-3	0
Safety	2	2	2	2
Pedestrian	1	0	0	-.5
Average	-.75	.25	-.13	.38
Rank	4	2	3	1

Note: A score of +3 indicates highest positive impact and a score of -3 indicates highest negative impact.

7. STUDY RECOMMENDATIONS



OVERVIEW OF RECOMMENDATIONS

The FUMS land use and multimodal transportation recommendations were developed through a citizen's driven integrated public participation and technical process. The comprehensive public participation process consisted of Focus Groups, Shaping the Future Conference, Public Open House, newsletters, direct mailings, and media announcements. Through this process, the public identified issues and potential solutions that were refined and evaluated through a highly technical process guided by a Project Advisory Committee. As a result, the recommendations presented here are responsive to the major issues identified by the public, as shown in Table 23.

Moreover, the recommendations build upon the goals and direction of the Flagstaff Vision 2020, adopted RLTP, and Flagstaff DRG (see Table 24). Final recommendations were refined through a second series of Focus Group meetings and a Public Open House. The final recommendations were developed to achieve a balance between providing efficient traffic operations on the two state routes and providing increased circulation of all modes within the study corridors.

Land Use and multimodal recommendations are illustrated in Figures 26 through 35, at the end of the chapter. Recommended land use within the study corridors includes the implementation of mixed-use activity centers at seven nodes within the study corridors. The purpose of activity centers is to encourage the reduction of automobile trips and to encourage transit, walking, and bicycling. Activity centers are approximately one-fourth mile in radius encompassing approximately 40 acres comprised of intensified mixed residential, commercial, and office uses. Urban design concepts were developed to illustrate how the core areas of the activity centers might develop as these areas are redeveloped.

Corridor improvements include a four-lane divided cross-section and access management strategies for both Milton Road and West Route 66. Access management strategies include raised mountable medians, reduced number of driveways, and backage roads. The roadway cross-section of West 66 from Blackbird Roost to Woody Mountain Road includes on-street bike lanes.

TABLE 23. MAJOR ISSUES ADDRESSED BY FUMS RECOMMENDATIONS

Public Identified Issues	FUMS Recommendation
Traffic Congestion	<ul style="list-style-type: none"> • Backage roads improve circulation and relieve state routes. • Access management (raised medians, reduced number of driveways) reduces vehicles conflicts and improves travel time. • Widening on portion of West Route 66 improves traffic operations. • Dual left-turn lane at East Route 66/Humphreys Street addresses bottleneck condition north of BNSF Railroad Bridge. • Coordinated traffic signals improve traffic flow. • Additional turn lanes at selected intersections improve traffic operations.
Pedestrian and Bicycling Circulation	<ul style="list-style-type: none"> • Grade separated pedestrian/bicycle crossings improves pedestrian and bicycling circulation across state routes. • Backage roads provide opportunities for walking and bicycling. • Enhanced FUTS improves connectivity and circulation. • Enhanced on-street bicycle system improves connectivity and circulation. • Enhanced pedestrian connections improve connectivity and circulation. • Activity centers and urban design concepts support walking and bicycling.
Public Safety	<ul style="list-style-type: none"> • Access management (raised medians, reduced number of driveways) significantly reduces crashes and reduces conflicts for all modes. • Pedestrian/bicycle grade separated crossings significantly improves safety. • Multimodal street crossings allow for safe crossing by pedestrian and bicyclists.
Community Character	<ul style="list-style-type: none"> • Mixed-use activity centers define community character at nodes throughout the corridor. • Urban design concepts consistent with Design Review Guidelines reinforce community goals. • Gateways on Milton Road and West Route 66 set the community theme as people enter the City. • Consistent cross-sections and landscaping improve aesthetics along the state routes.
Public Transit	<ul style="list-style-type: none"> • Backage roads provide opportunities for improved transit circulation. • Enhanced transit route structure improves transit circulation. • Recommended seamless transit system integrating Mountain Line and NAU systems should improve connectivity by transit. • Activity centers and urban design concepts support transit use.
Environment	<ul style="list-style-type: none"> • Roadway improvements and access management improve air quality by alleviating congestion. • Activity centers and urban design concepts support improved environment by encouraging alternative modes.

**TABLE 24. FLAGSTAFF POLICIES AND PROCEDURES SUPPORTED
BY FUMS RECOMMENDATIONS**

Regional Land Use and Transportation Plan Policies
<ul style="list-style-type: none"> • Provide for new mixed-use neighborhood. • Emphasis on all modes- commercial and residential areas shall include full accommodation for pedestrian and bicycle travel and transit access. • Emphasis on traditional neighborhood development and development design. • Include a mix of uses in new commercial development and redevelopment. • Develop a balanced transportation system to meet local mobility choices and needs. • Create an efficient transportation system – connectivity and continuity. • Promote a high quality urban environment in all commercial development areas – provide for walking, bicycling, and transit opportunities. • Establish roadway improvement categories: <ul style="list-style-type: none"> – Priority 1 - Safety problems – Priority 2 - Transportation systems management investments that improve flow of traffic: Signalization, access management, intersection reconstruction, intersection separations, and similar types of projects • Provide intermodal connectivity. • Coordinate a public transit system. • Establish a comprehensive bicycling network and trails system. • Promote accessible, pedestrian friendly community design: <ul style="list-style-type: none"> – Future commercial and residential projects in the region shall be planned and designed to ensure that sites and land uses are readily accessible to all modes. • Promote transportation modes other than single occupancy vehicles.
Design Review Guidelines
<ul style="list-style-type: none"> • Pedestrian and bicycle circulation systems should be coordinated throughout the community. • Each street should have a distinct landscape design. • Provide direct automobile access to an abutting property when feasible. • Establish interconnected neighborhood street and sidewalk patterns. • Provide convenient connections to regional pedestrian and bikeway circulation systems. • Orient buildings toward front of streets. • Locate parking to the side and rear of the building. • Limit access points. • Pedestrian and automobile connections shall be provided to adjoining properties when feasible. • Continuity of pedestrian systems shall be stressed and connections should be provided to adjoining properties when feasible. • Sidewalk shall be detached from the curb with a planting strip when feasible. • Limit the number of curb cuts onto a public street along a property edge.

Source: *Flagstaff Area Regional Land Use and Transportation Plan*, November 2001
Design Review Guidelines

Recommendations include backage roads parallel to Milton Road and West Route 66 that provide direct access to the “back” of properties adjacent to the state routes and improve circulation. Backage roads include the extension of Beulah to Metz Walk and the extension of Riordan Ranch Road to West Route 66 and Sanders Drive. In addition, a backage road is recommended along Kaibab Lane between Clay Avenue and Dunnam Street. Pedestrian/bicycle grade-separated crossings are recommended along Milton Road, West Route 66, and across Humphreys Street between East Route 66 and Aspen Avenue. In addition, multimodal at-grade crossings are recommended. At-grade signalized intersection crossings are designed to accommodate pedestrian crosswalks and bike lanes. Corridor recommendations also include visual gateways at Milton Road just north of I-17 and West Route 66 east of I-40 emphasizing the community’s character to corridor travelers.

A vital component of the recommendations consists of enhancement and expansion of multimodal facilities. Recommended transit improvements include restructured transit routes, expanded service area, increased service frequency, and seamless transit operations between Mountain Line and Campus transit. The enhanced FUTS expands the adopted FUTS system to address future growth and to close gaps in the trail system within the corridor. The proposed on-street bicycle as well as pedestrian networks provides continuous east-west and north-south connections. The bicycle and pedestrian networks are connected to residential areas, NAU campus, commercial areas, major activities, and the FUTS. In addition, the pedestrian network closes gaps in the FUTS. The pedestrian facilities within the study corridors consist of sidewalks, multiuse trails, proposed multimodal crossings, and candidate grade separated crossings.

In addition to the above recommendations, transportation management options have been identified and are discussed in more detail later in this chapter.

BUILDING RECOMMENDATIONS THROUGH PUBLIC PARTICIPATION

The corridor issues were identified by the public through public participation activities including Focus Groups, Shaping the Future Conference, and Public Open House meetings. Chapter 2 of this report discusses the first series of public participation in detail. Issues and potential mobility solutions were identified by participants in the Focus Groups and the Shaping the Future Conference and were translated onto corridor maps. Participants in the first Open House reviewed the maps of the issues and potential solutions, and made additional comments. Participants also identified how important the issues were and how favorable potential solutions were to them. The PAC provided significant input on the issues, potential solutions, identification of alternative mobility packages, and evaluation of the mobility packages.

The purpose of the second series of public participation meetings was to provide the opportunity for the public to respond to the draft recommendations. Three Focus Groups comprised of government agency representatives, residents, and business representatives reviewed the recommendations and voted on how favorable the major recommendations were to them. Recommendations were then presented at the second Public Open House meeting for

review and comment. The input provided by the PAC, Focus Groups and Open House are described below. The resulting input of the public is also summarized.

Project Advisory Committee

Initial draft recommendations were constructed from components of the three alternative mobility packages that were evaluated in detail. The packages were developed and evaluated in coordination with the PAC. Based on this process, a set of draft preferred recommendations were then prepared for land use, roadway improvements, and multimodal facilities. However, there were disagreements among PAC members on several recommendations. Disagreements included eliminating access from Milton Road to Mike's Pike, reconstructing the intersection of University Drive as a cul-de-sac, and constructing an eastbound dual left-turn lane at the East Route 66/Humphreys Street intersection. In addition, some members of the PAC had concerns about the recommendation of the mixed-use activity centers and urban design concepts. A facilitated consensus building meeting was held to resolve differences among PAC members.

The PAC agreed that the following should remain for public review:

- The activity centers and urban design concepts as recommended
- University Drive would be treated as a right-in/right-out driveway to the property west of Milton Road
- The dual left-turn lane at the East Route 66/Humphreys Street intersection
- The maps of the transit, FUTS, on-street bicycle facilities, and pedestrian connections as recommended with minor revisions

The PAC did not reach a consensus of the elimination of access to Mike's Pike but agreed to include the recommendation for public review.

Second Series Focus Groups

The second series of Focus Groups was held on February 26 and 27, 2003. Three Focus Groups comprised of agency representatives, private business representations, and residents provided comments on the draft recommendations. Approximately 40 people attended the three Focus Groups. An overview of the project and draft recommendations was first presented to the Focus Groups. Next, the attendees were "walked" through each of the maps, presented the recommendations, and asked for their comments. Each attendee was also given the opportunity to provide additional comments on issues and recommendations. The attendees then voted on the recommendation.

Second Series Public Open House Meetings

The second Public Open House was held on April 28, 2003. The Open House was the fifth public event held in conjunction with the study. Considerable public information announcing the Public Open House was executed successfully. The local press conducted interviews and covered the event.

An overview of the project and the draft recommendations was presented to the attendees. Questions were taken following the presentation. Following the questions and answers, the Public Open House was structured with a series of stations where participants could view and provide written comment on various aspects of the project's process. Display boards at the various stations outlined the public involvement process, existing conditions, issues, and recommended improvements. The consultant team members were available to answer questions and document verbal comments. Participants were asked to vote on the recommended improvements for the two corridors and fill out comment cards in regard to the project.

Summary of Public Participation Input

A summary of the voting by Focus Group and Open House participants is presented in Table 25. Issues that were common among the Focus Group participants and comments from the Open House are presented in Table 26. Both the Focus Group participants and Open House participants supported the following recommendations:

Access Management

- Goal of one-quarter mile plus intersection spacing for urban sections
- Goal of one-half mile intersection spacing for transition and rural sections
- Roadway cross-sections for Milton Road/East Route 66, and West Route 66 as presented on the map of the Corridor Recommendations
- Raised medians
- Backage roads
- Reduced driveways
- Pedestrian/bicycle grade separations
- Eliminate Milton Road/University Avenue T-intersection and replace with right-in/right-out driveway coordinated with the realignment of University Avenue to meet University Drive

Land Use and Redevelopment

- Activity Centers
- Redevelopment Concepts

TABLE 25. SUMMARY OF VOTING BY FOCUS GROUP AND OPEN HOUSE PARTICIPANTS

WEST ROUTE 66

Recommendation	Focus Group			Open House		
	Very Much/ Somewhat in Favor	Neutral	Not in Favor/Not at all in Favor	Very Much/ Somewhat in Favor	Neutral	Not in Favor/Not at all in Favor
Access Management:						
Goal of one-quarter mile plus intersection spacing for urban section.	17	7	1	4	1	
Goal of one-half mile intersection spacing for transition and rural sections	16	5	3	4	1	
Roadway cross-sections	20	2		2	1	
Medians	21	1	2	5		
Backage road	23			5		
Reduced driveways	22	3	1	6		
Land Use:						
Activity Centers	21	3		3	1	
Pedestrian/Bicycle Grade Separations	18		8	6		1

MILTON ROAD/EAST ROUTE 66

Recommendation	Focus Groups			Open House		
	Very Much/ Somewhat in Favor	Neutral	Not in Favor/Not at all in Favor	Very Much/ Somewhat in Favor	Neutral	Not in Favor/Not at all in Favor
Access Management:						
Goal of one-quarter mile intersection spacing	17	9		3	1	
Roadway cross-section	16	3	2	2	1	
Medians	24	1		5		
Backage roads	25			7		
Reduced driveways	20	4	1	6		
Dual left-turn lane/add NB lane on US 180	23	2	1	2		6
Milton Road/University Avenue: Eliminate intersection, replace with right-in/right-out driveway	14	7	2	3	1	1
Mike's Pike cul-de-sac	8	0	6	3	1	3
Land Use:						
Activity Centers	15	8		3	1	
Redevelopment Concepts:						
Minor redevelopment concept	16	5	1	1		1
Major redevelopment concept	16	5		3		
Pedestrian/Bicycle Grade Separations	22	4		8		1

MULTIMODAL MAPS

Recommendation	Focus Group			Open House		
	Very Much/ Somewhat in Favor	Neutral	Not in Favor/Not at all in Favor	Very Much/ Somewhat in Favor	Neutral	Not in Favor/Not at all in Favor
Flagstaff Urban Trails System Map	22	1	1	8		
On-Street Bicycle Facilities and Multiuse Trails Map	23			7		1
Major Pedestrian Links and Multiuse Trails Map	23			9		
Proposed Future Transit Map	23			5		

TABLE 26. FOCUS GROUP AND OPEN HOUSE COMMENTS

Common Issues Among Focus Groups	
<ul style="list-style-type: none">• The participants liked the fact that the recommendations reflected the input provided by the general public, businesses, and stakeholders earlier in the process.• All of the participants recognized the need that something needed to be done and that this was a good approach to dealing with this problem.• Though there was support for the redevelopment process, there was also concern for how long the redevelopment process takes.• Strong support for the backage road concept• The participants agreed that access management needed to be done but concerned that local businesses might fight this recommendation.• There is support and understanding of the mixed-use nodes for concentrating uses and trips to enhance mobility.• There are still concerns remaining about the medians and the impact on emergency response. However, the backage road concept is viewed as a way to enhance emergency response.• Participants felt that overall connectivity for pedestrian, transit, and bicycle facilities would be improved.• Participants agreed that implementation is very important.• The Agency Group reached consensus to form a task force to advance the design concept of a dual left-turn lane at the East Route 66/Humphreys Street intersection.	
Open House Comments	
<ul style="list-style-type: none">• I would like more emphasis on elimination of at-grade railroad crossings.• Mass transit routes should focus on high-density areas of the City and not those already optimized for automobile access (such as the Milton-Riordan pair).• I like most of the plan very much, especially the bike/pedestrian separations and the Beulah and Riordan Ranch backage road.• I do not like the Kaibab backage road because of its impact on the Old Town residential districts.• The dual left run off Humphreys and Route 66 would double the danger for pedestrians at an already dangerous intersection unless there was either a crossing (where all traffic stops for pedestrians) or a grade separation.• Rebuild the railroad overpass 100 feet south with longer spans which allows for total change to the Santa Fe-66-Humphreys traffic circulation. By moving south, construction can be done without disrupting railroad traffic. Envision the possibilities.• I like the projects you are proposing.• I am not in favor of making Mike's Pike into a cul-de-sac! It is one of those existing backage roads which local's value – also is the original Route 66 and therefore is valuable as a historic asset.• Are property owners on South Milton on board for the “development node” idea?• Double left-turn lanes at Humphreys will create a worse pedestrian-like hazard – also merging back into one lane will be a problem.• Dual left is a bad idea.• Mike's Pike should be left open.• A twenty-year plan that appears to imply significant growth, but is sufficient water available to allow this continual growth?• The real solution is to by-pass Highway 180 – use one of the proposed routes west of town and route that tourist traffic away from Ft. Valley Road and Milton Road. Living in Coconino Estates, we use Ft. Valley Road and traffic is a problem. Do not let the tourist industry control your efforts. Listen to the citizens.• The signage on West Route 66, Milton Road, and East Route 66 are very important for visitors. Having signs to follow will eliminate confusion and help traffic flow move smoothly.• The backage roads seem to be a practical addition to Milton Road. Residents of any city seem to take back roads/short cuts.• Great charts and maps. Clear explanations.• For pedestrian walkways, I prefer to use overpasses rather than underpasses – they seem safer.• North Humphreys will be going from two lanes down to one far too close to the school. This could be trouble for kids trying to cross. Big problem is southbound Snowbowl closes everyone leaves at the same time and all go south.• Many good ideas. My suggestions: 1) Make business access “Pork Chop Style” with no left turn access; 2) Make timing a higher priority on signalized access points (timing intersection location).• Glad to see the expansion of FUTS.• University Avenue connection with San Francisco is good!• Crossings over railroad tracks are great.• Gateway features are nice.	

Multimodal Maps

- Flagstaff Urban Trails System Map
- On-Street Bicycle Facilities and Multiuse Trails Map
- Major Pedestrian Links and Multiuse Trails Map
- Proposed Future Transit Map

Focus Group and Open House participants were split on the recommendation to eliminate the intersection of Mikes Pike with Milton Road and on the dual left-turn lane at the East Route 66/Humphreys Street intersection.

The recommendation for the backage roads received strong support among all participants supported by the voting and comments as well. However, comments from both Focus Group and Open House participants questioned the impacts of the extension of Kaibab Lane between Clay Avenue and existing Kaibab Lane on the adjacent community.

ELABORATION OF CORRIDOR IMPROVEMENTS

Land Use and Urban Design

The proposed land use within the study corridors illustrated in Figure 26 consists of land use patterns similar to those patterns found in the *Flagstaff Area Regional Land Use and Transportation Plan*. However, the recommended land use includes mixed-use community activity centers (shown as red circles on the figure) that are intended to concentrate development for reducing vehicle trips and encouraging the alternative modes of transit, walking, and bicycling. The proposed activity centers are at the following locations:

- Downtown area
- Beaver Street and Butler Avenue
- Intersection of Route 66 and Milton Road
- Intersection of Milton Road and University Drive
- Intersection of Woodlands Village Boulevard and University Avenue
- Intersection of Woody Mountain Road and West Route 66
- Proposed intersection just east of Woody Mountain Road, west of Forest Meadows Street and south of West Route 66.

The nodes are activity centers approximately one-fourth mile in radius encompassing approximately 40 acres. Intensification of uses within the mixed-use centers will occur through an increase in Floor Area Ratios and building heights, as well as through a reduction in parking requirements. The activity centers are consistent with the policies of the adopted RLTP and the urban design concepts are consistent with the Flagstaff DRG.

Urban design concepts were developed to illustrate how the core areas of the activity centers could be developed as those areas are re-developed over time. Commercial sites along Milton Road and portions of West Route 66 would be reoriented with buildings moved toward Milton Road and parking towards the back of the site. Access along Milton Road, for example, would be reoriented from Milton Road to the backage streets along Milton Road. Figures 27, 28, and 29 illustrate two urban design concepts for the node at the Milton Road/University Drive intersection. The first concept shown in Figure 27, Conceptual Land Use Plan A – Minor Redevelopment, illustrates how the existing properties might undergo minor redevelopment by fitting new buildings into sites with existing buildings. The new buildings would be reoriented to the front of University Drive with parking areas served by the backage roads of Beulah Boulevard and Riordan Ranch Road. Figure 29 presents the primary multimodal streetscape illustrating the orientation of the buildings, parking areas, pedestrian and bicycle facilities, and landscape features.

Conceptual Land Use Plan B - Major Redevelopment illustrated in Figure 28 has more intense development with more floor space and parking structures. Building orientation is along University Drive with parking structures accessed from Beulah Avenue and Riordan Ranch Road. The streetscape is similar to that illustrated in Conceptual Land Use Plan A.

Another recommendation as shown in Figure 30 is to construct gateways to the City on Milton Road just north of the I-17 interchange and on West Route 66 within the vicinity of Flagstaff Ranch Road.

Corridor Improvements

From the multitude of issues and possible solutions, a series of corridor improvements were identified. Corridor improvements are illustrated in Figure 31 and described below.

Milton Road/East Route 66

- Access Management – Four-lane divided mountable median, separated sidewalks, with landscaping, reduced number of driveways (50% reduction goal), right-in/right-out driveway access, U-turns permitted at selected intersections.
- No new cross streets to maximize progression along Milton Road.
- Realign University Avenue to University Drive and replace University Avenue intersection with a right-in/right-out driveway on Milton Road.
- New signalized intersection at Milton Road/Chambers Drive.
- Additional turn lanes to improve operations:
 - Dual eastbound left-turn lane at the East Route 66/Humphreys Street intersection
 - Dual southbound left-turn lane on Milton Road at University Drive.
 - Dual northbound left-turn lane on Milton Road at Forest Meadows Street.
 - Westbound right-turn lane on Butler Avenue at Milton Road.

- Close the intersection of Milton Road/Mikes Pike as an access management tactic in order to minimize vehicle conflicts on Milton Road between Butler Avenue and Mikes Pike. The closing of the Mikes Pike intersection is also required to accommodate traffic turning right from the recommended westbound right-turn lane at the Milton Road/Butler Avenue intersection. Further study is needed to determine the feasibility of relocating the existing Mikes Pike intersection to the north as well as access from Butler Avenue to the area between Butler Avenue and the BNSF railroad tracks.
- Multimodal at-grade crossings at Chambers Drive, Riordan Road, West Route 66, Butler Avenue, Humphreys Street, Beaver Street, and San Francisco Street.
- Candidate grade separated crossings located at Milton Road/University Drive intersection and two locations on Milton Road between University Drive and Plaza Way in addition to a site in the vicinity of Malpais Lane.
- Gateway just north of I-17 interchange.

Parallel Backage Roads

- Implement backage roads in phases as indicated in Figure 31.
- Construct extension of Beulah Boulevard as a multimodal roadway with bike lanes and no parking from Forest Meadows Street to Metz Walk.
- Construct Riordan Ranch Street as a multimodal roadway with bike lanes and no parking from Riordan Road to Sanders Drive.
- Construct Chambers Drive from Riordan Ranch Street to Beulah Boulevard.
- Construct backage roads as two-lane streets with bike lanes and sidewalk.
- Provide cross connections at Riordan Road, Yale Street, Chambers Drive, and University Drive.
- Reorient primary access to the development along Milton Road to the backage roads, as redevelopment occurs along Milton Road.

West Route 66

- Access Management – From Milton Road to Blackbird Roost, four-lane divided mountable median, separated sidewalks with landscaping, reduced number of driveways, right-in/right-out access, and U-turns permitted at selected intersections.
- Access Management – From Blackbird Roost to Woody Mountain Road, four-lane divided median, separated sidewalks with landscaping, reduced number of driveways, right-in/right-out access, and bike lanes.
- Rural cross-section – two-lanes, shoulders, from Woody Mountain Road to I-40.
- Westbound double left-turn lane at Woodland Village Boulevard.
- New Signalized intersection at Metz Walk/Blackbird Roost.
- Grade separated crossing at Metz Walk/Blackbird Roost.

- Multimodal at grade crossing at Woodland Village Boulevard and West Route 66.
- Gateway in the vicinity of Flagstaff Ranch Road.

Corridor Operational Improvements

- Conduct a Downtown traffic circulation study. The City of Flagstaff should conduct a Downtown traffic circulation study to accommodate the downtown traffic including the redevelopment area.
- Coordinate traffic signals along Milton Road, East Route 66, Humphreys Street, and Downtown traffic signals.
- Conduct a comprehensive “Way Finding” study to identify types and locations of guidance signs for automobiles, buses, pedestrians, and bicycles. Directional signs need to be located along East Route 66, West Route 66, Milton Road, and Downtown to guide automobiles seeking US 180 into the proper lanes.
- Provide maps and travel information for visitors to give them directions to destinations.

Other Corridor Recommendations

- Construct the adopted RLTP transportation improvements including Lone Tree Road Interchange, Lone Tree Road improvements, and the Lone Tree Overpass. The traffic evaluation findings reported in *Chapter 5. Evaluation of Alternative Mobility Package* indicated that traffic operations along Milton Road and Route 66 will deteriorate significantly if these improvements were not implemented.
- Provide for multimodal at-grade crossings at Butler Avenue and Beaver Street and at Butler Avenue and San Francisco Street.
- Construct Grade separated crossings at Walnut Street and BNSF Rail Road, at The Rio de Flag east of the BNSF Rail Road Bridge, and at Humphreys Street and City Hall.
- Construct additional roadway connections as identified in Figure 31.
- Reserve right-of-way along Milton Road and West Route 66 as sites are developed or redeveloped.
- Implement a snow removal strategy for the state routes as medians are constructed. Also, develop a strategy to remove snow from pedestrian and bicycle facilities.
- Develop a strategy for emergency vehicle operations as medians are constructed.

Transit Recommendations

- Revise and expand transit route structure as shown in Figure 32 and increase service frequency. The route structure follows the recommendations in the Nelson Nygaard

Report *Operational Audit of the Five Year Transit Plan* except that the FUMS also recommend the following:

- Add future service to the airport and Fort Tuthill.
- Restructure routes to encourage increased use by NAU and Coconino Community College (CCC) students, as well as discretionary riders.
 - ✓ Re-route Route 2 to operate on Milton Road all the way to Beulah Boulevard south of McConnell Circle. Re-route the western leg of the Route 4 loop to travel through the Woodlands Village area.
 - ✓ When vehicles and funding to implement 30-minute headways become available, operate the Route 4 loop in opposite directions on alternate trips, effecting 2-way service on all segments of the route.
 - ✓ Structure a schedule to function as a shuttle between NAU and CCC during class hours to facilitate shared use of facilities, etc. Explore restructuring Route 4 or extending one of the NAU campus loops.
- Enhance coordination between the Mountain Line and Mountain Campus Transit systems with an ultimate goal of operating as one seamless system.
- Coordinate operation of the Mountain Line and Mountain Campus Transit fixed routes; the VanGo demand-response system; and the establishment and maintenance of ride-share, “bike with a buddy;” and other strategies designed to encourage use of alternative modes.
- Enhance presence of service with shelters and bus bays that are attractive, attention-getting additions to streetscape.
- Adopt a multimodal-friendly strategy for snow management and removal that takes into consideration pedestrians, bicyclists, and transit users such as snow removal from bus bays and transit facilities.
- Enhance Web presence of system with dedicated Web site.
- Consider future implementation of Geographic Positioning System-based technology that would provide real time route and schedule information.
- Operate Shuttles to special events in the study area, particularly to events where parking may be—or perceived to be—a problem, such as NAU sports events and Fort Tuthill events and festivals.
- Provide incentives to use transit including increased campus parking fees and development of hotel shuttles to NAU games and other special events.

- Construct a gateway facility at the south end of Milton Road that would provide for:
 - Tourist information center
 - Transit center and possible bicycle rental
 - Transition from I-17 to urban arterial
- Produce a map showing transit routes together with pedestrian and bicycle facilities.

Trails System and Pedestrian Connections Recommendation

- Implement enhanced FUTS and pedestrian connections as shown in Figures 33 and 34. The proposed pedestrian network is a continuous network providing both east-west and north south connections to the FUTS, residential areas, NAU campus, commercial areas, and major activities. Pedestrian facilities within the study corridors consist of multiuse trails, sidewalks, proposed multimodal crossings, and candidate grade separated crossings.
- Construct grade separated pedestrian/bicycle crossings in order to maintain continuity and connectivity as shown on Figures 32 and 33. Crossings could be either overpasses or underpasses. Implement multimodal crossings at signalized intersection crossings designed to accommodate pedestrian crosswalks and bike lanes.
- Update the existing sidewalks within the study corridors that do not meet ADA standards and construct new sidewalks to ADA standards.
- Design pedestrian facilities in accordance with the Flagstaff Pedestrian and Bicycle Guidelines when completed.
- Develop sites in accordance with the guidelines of the City of Flagstaff's *Design Review Guidelines* to ensure that the sites encourage and accommodate pedestrian accessibility, and maintains continuity of the pedestrian network.
- Produce and widely distribute a map for the pedestrian facilities.

On-Street Bicycle Recommendations

- The proposed bicycle facilities shown in Figure 36 is a continuous network providing both east-west and north-south connections to the FUTS, residential areas, NAU campus, commercial areas, and major activities.
- The bicycle network consists of on-street facilities, multiuse trails, proposed multimodal crossings, and candidate grade separated crossings. As previously noted, multimodal crossings are at-grade signalized intersection crossings designed to accommodate pedestrian crosswalks and bike lanes.
- Provide bicycle storage in the major activity centers as well as the commercial centers along Milton Road, East Route 66, and West Route 66.
- Include shower and locker facilities in private and public office buildings.

- Design bicycle facilities in accordance with the Flagstaff *Pedestrian and Bicycle Design Guidelines*.
- Develop sites in accordance with the guidelines of the City of Flagstaff's *Design Review Guidelines* to ensure that the sites encourage and accommodate bicycle accessibility, and maintains continuity of the bicycle network.
- Produce and widely distribute a map for the bicycle facilities.

Travel Demand and System Management Recommendations

- Strive toward the adopted RLTP goal of a regionwide 11 percent shift from the auto mode to alternative modes, by aggressively promoting and funding alternative modes.
- ADOT, the City of Flagstaff, FMPO, Coconino County, and NAU should designate an alternative mode coordinator to implement pedestrian, bicycle, and transit facilities, as well as carpooling.
- A periodic survey of residents and visitors should be conducted on the use of all the modes of transportation.
- Carpooling and vanpooling strategies should be developed in coordination with ADOT, City of Flagstaff, Coconino County, and NAU.
- Reduce student vehicle use through parking fees and resident vehicle restrictions.

ELABORATION OF DOWNTOWN IMPROVEMENTS

Roadway Improvements

Correct Bottleneck Problem at East Route 66/Humphreys Street Intersection

- Construct a dual eastbound left-turn lane at the East Route 66/Humphreys Street intersection. The Humphreys Street improvements should provide street level improvements and signal phasing that mitigate the negative impacts on pedestrian movements and the pedestrian environment.
- Add an additional northbound lane on Humphreys Street from East Route 66 to Aspen Avenue and a merge lane north of Aspen Avenue. The merge from two lanes northbound to the existing one lane northbound can be achieved by Birch Avenue. However, the extension of the merge to Cherry Avenue is desirable.
- Retain northbound left-turn lane at Sitgreaves Street.

Correct Traffic Backup on Southbound Humphreys Street and Southbound Beaver Street

- Add a southbound lane on Humphreys Street from Birch Avenue to East Route 66 to improve the traffic flow.

- Enlarge the turning radius for the southbound right-turn lane on Humphreys Street at the East Route 66/Humphreys Street intersection.
- Extend both the southbound right-turn and left-turn lane storage on Beaver Street at East Route 66. Extend the right-turn lane north to Birch Avenue. This will improve flow on Beaver Street and accommodate traffic accessing the parking garages proposed for the downtown redevelopment.

Downtown Multimodal Improvements

- Construct a pedestrian grade separation connecting the City Hall property to the Downtown redevelopment area on the northeast of the East Route 66/Humphreys Street intersection. Integrate the grade separation with structures for the Downtown redevelopment and the City Hall property, and connect to the sidewalk on Santa Fe Avenue.
- Connect the proposed grade separation to the Flagstaff Urban Trail System, other proposed grade separations, and trails to be incorporated into the Rio de Flag flood control project. Proposals include a pedestrian overpass of East Route 66 just north of the Burlington Northern Santa Fe Railroad Bridge, a pedestrian underpass of East Route 66 following the Rio de Flag channel, and a trail system south of the railroad tracks from the pedestrian bridge to the Humphreys Street alignment.
- Implement a Downtown bus circulator.

Implementation of Downtown Studies and Improvements

- Include the FUMS recommendations as part of Downtown Redevelopment Plan.
- Conduct downtown circulation study.
- Reserve right-of-way at the following locations:
 - The east side of Humphreys Street from East Route 66 to Cherry Avenue.
 - The west side of Humphreys Street from East Route 66 to Aspen Avenue.
 - The west side of Beaver Street from East Route 66 to Birch Avenue.
- Coordinate construction of roadway and pedestrian improvements with the proposed Downtown redevelopment and Rio de Flag flood control project.
- Retain existing median on East Route 66 west of Humphreys Street and connect the median to the proposed median on Milton Road. Construct a mountable median.

FIGURE 26. PROPOSED FUTURE CORRIDOR LAND USE

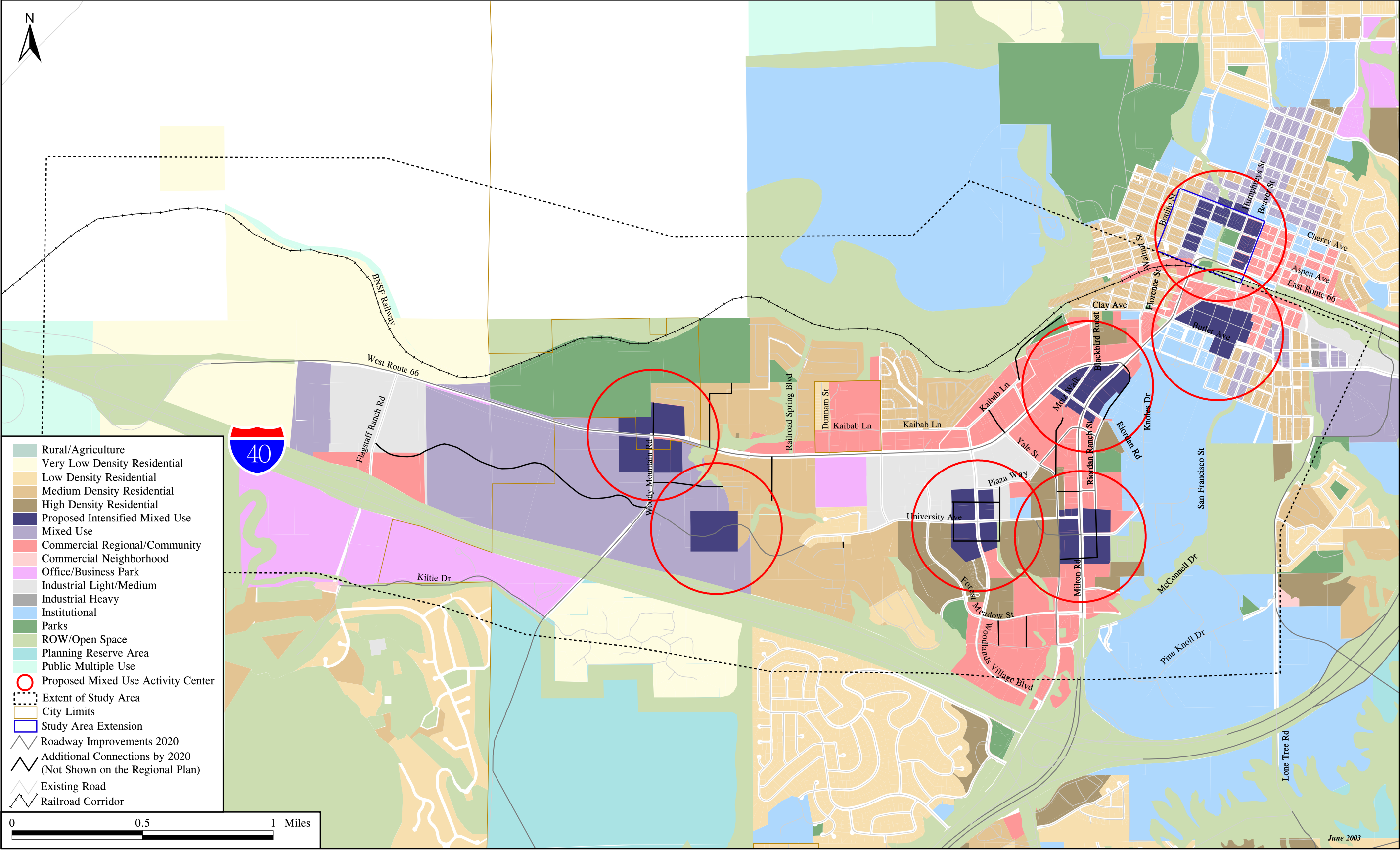
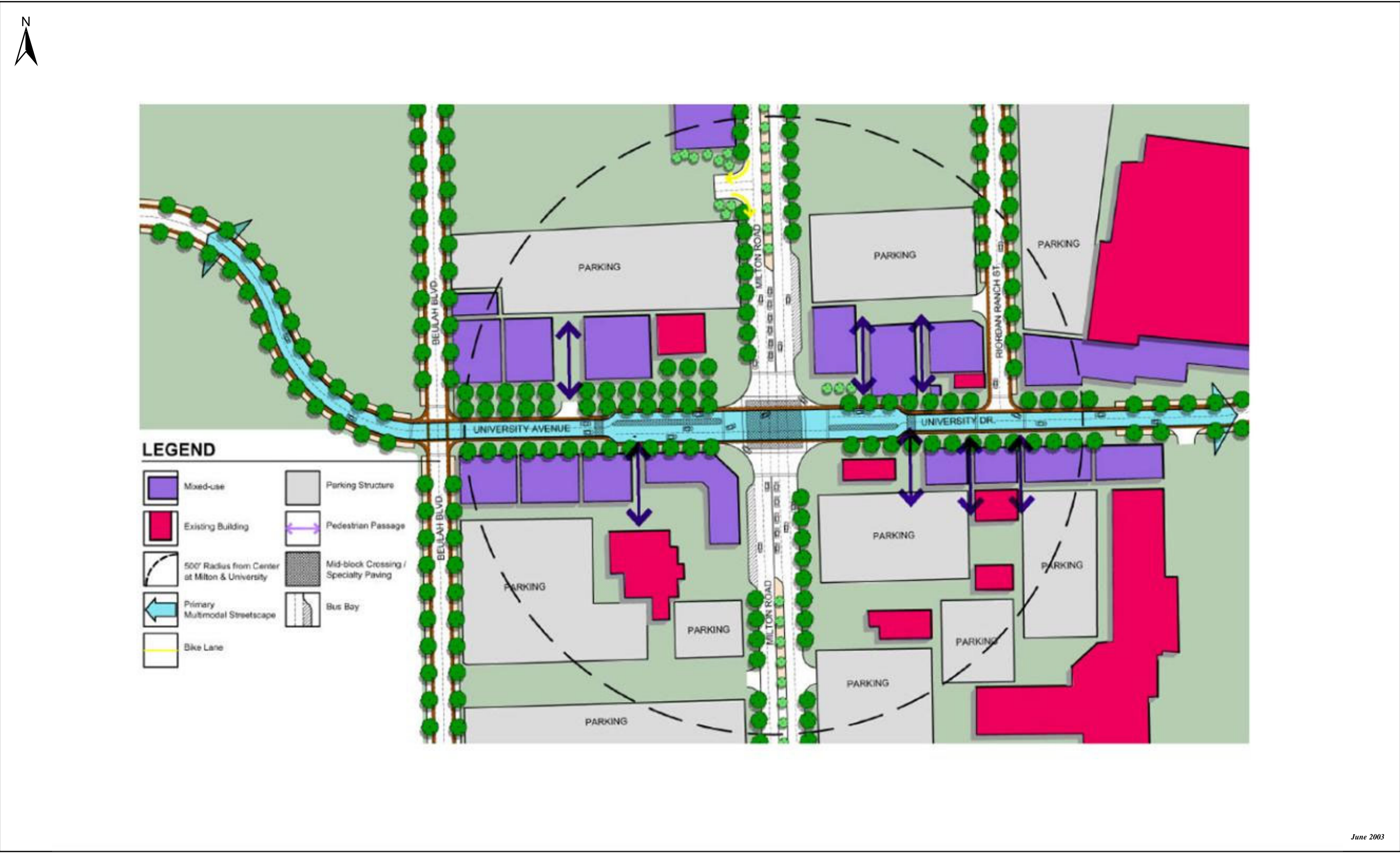


FIGURE 27. CONCEPTUAL LAND USE PLAN "A" - MINOR REDEVELOPMENT



June 2003

FIGURE 28. CONCEPTUAL LAND USE PLAN "B" - MAJOR REDEVELOPMENT

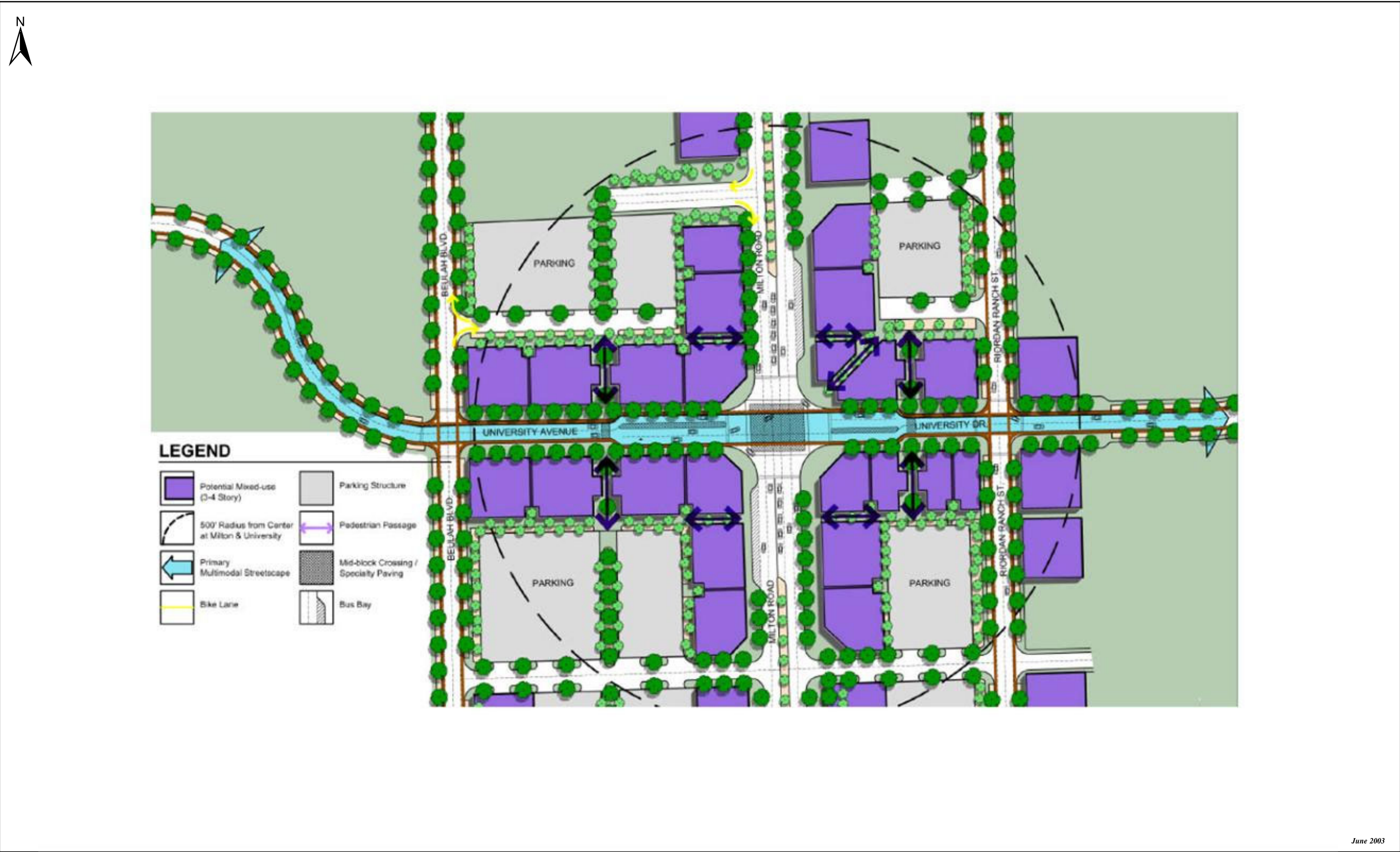
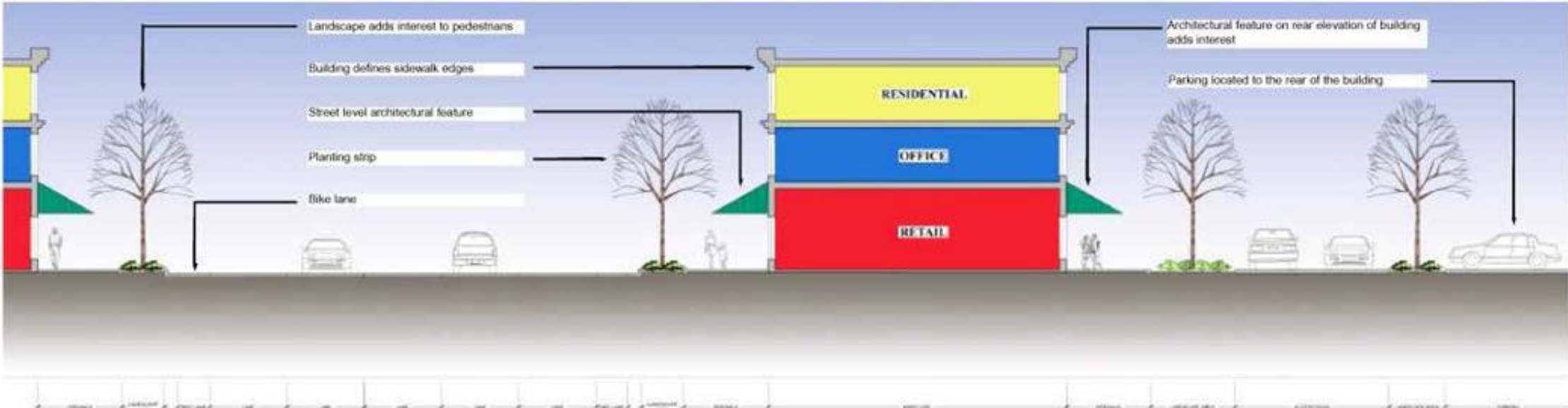


FIGURE 29. MULTIMODAL STREETSCAPE & STREETSCAPE BUILDOUT

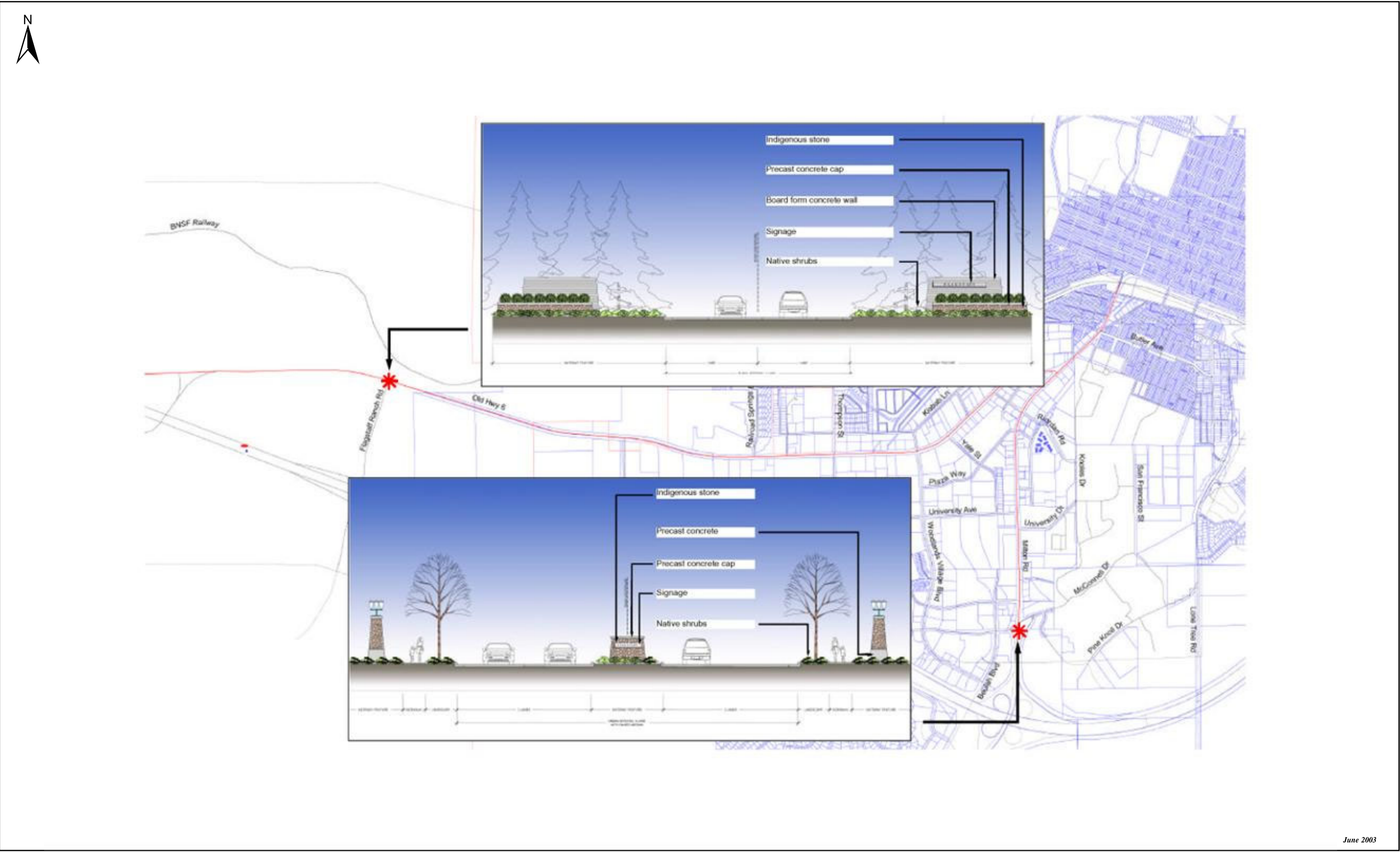


1) MULTIMODAL STREETSCAPE



2) MULTIMODAL STREETSCAPE BUILDOUT

FIGURE 30. GATEWAY FEATURE AT MILTON ROAD AND WEST ROUTE 66



June 2003

Legend:

- ▲ Candidate Grade Separated Ped/Bike Crossing
- ▲ Multimodal At-Grade Crossing
- * Proposed Traffic Signal
- * Existing Traffic Signal
- 2020 - Priority 1 - Backage Road System
- 2020 - 4-Lane With Raised Median
- 2020 - 4-Lanes With Raised Median
- 2020 - 2-Lane With Shoulders
- 2020 - Priority 2 - Backage Road System
- Extent of Study Area
- City Limits
- Study Area Extension
- Constructed by 2010
- Improved Existing Roadway by 2010
- Constructed by 2020
- Improved Existing Roadway by 2020
- Additional Connctions by 2020 (Not Shown on the Regional Plan)
- Existing Road
- Railroad Corridor

Scale: 0 to 1 Miles

Map Details:

- West Route 66:** Main corridor with various improvement projects.
- Intersections:** Key intersections include Woody Mountain Rd, Kaibab Ln, University Ave, and others.
- Backage Road System:** A network of roads designed to improve traffic flow and safety.
- Construction Phases:** Projects are categorized by completion dates (2010, 2020).
- Other Features:** Includes a north arrow, a scale bar, and a legend for various road types and crossings.

FIGURE 32. PROPOSED FUTURE TRANSIT

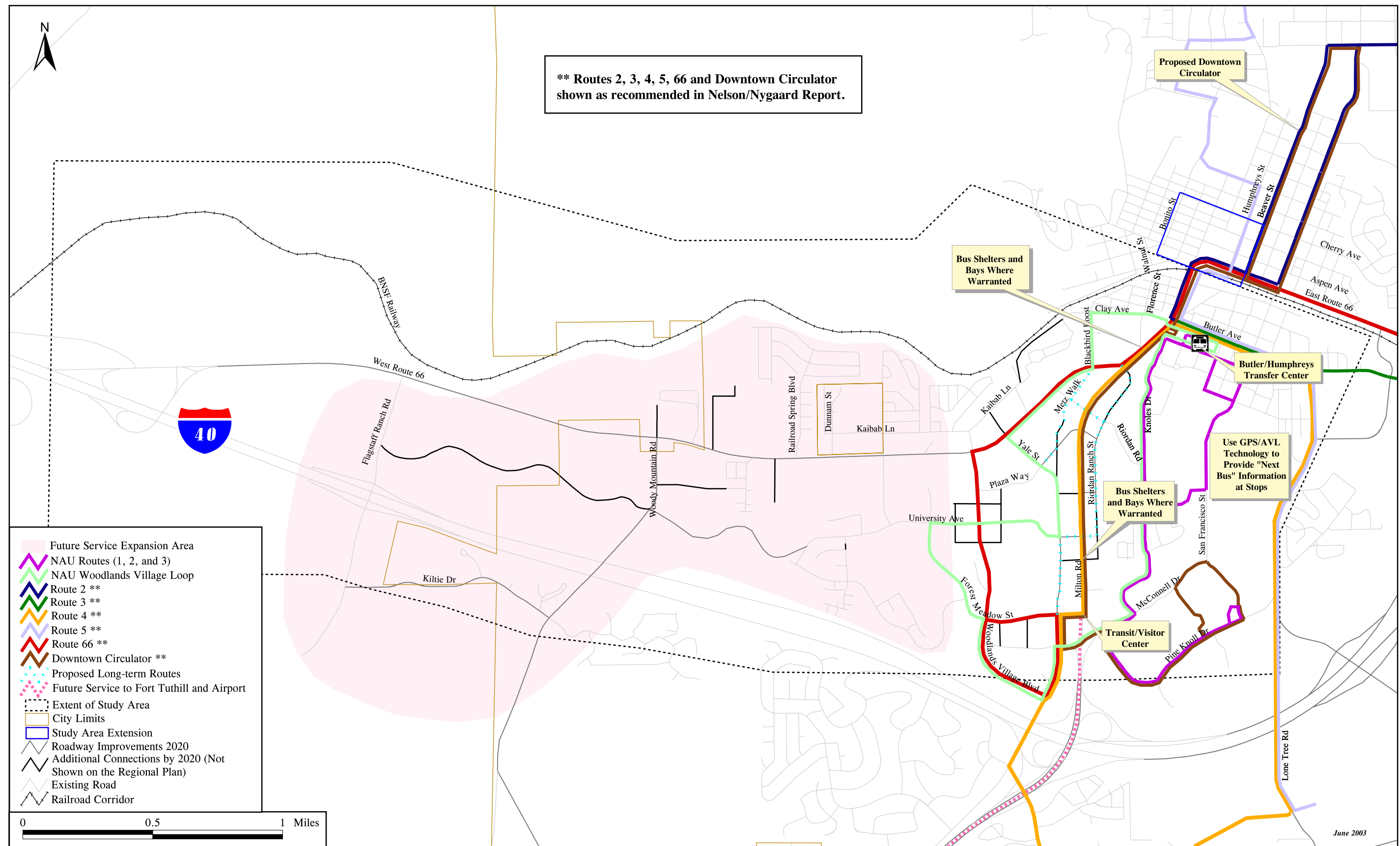


FIGURE 33. FLAGSTAFF URBAN TRAILS SYSTEM

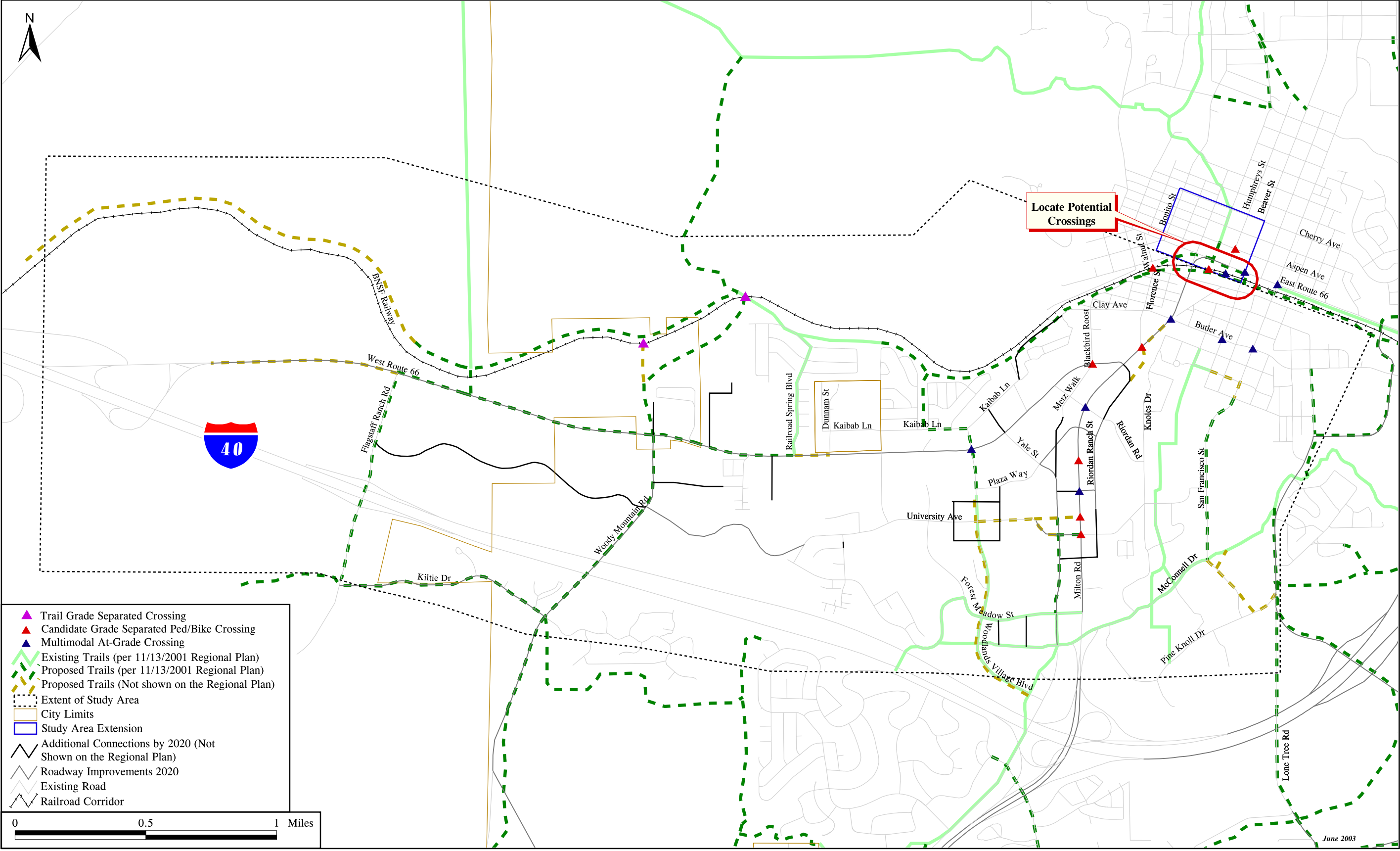


FIGURE 34. MAJOR PEDESTRIAN LINKS AND MULTIUSE TRAILS

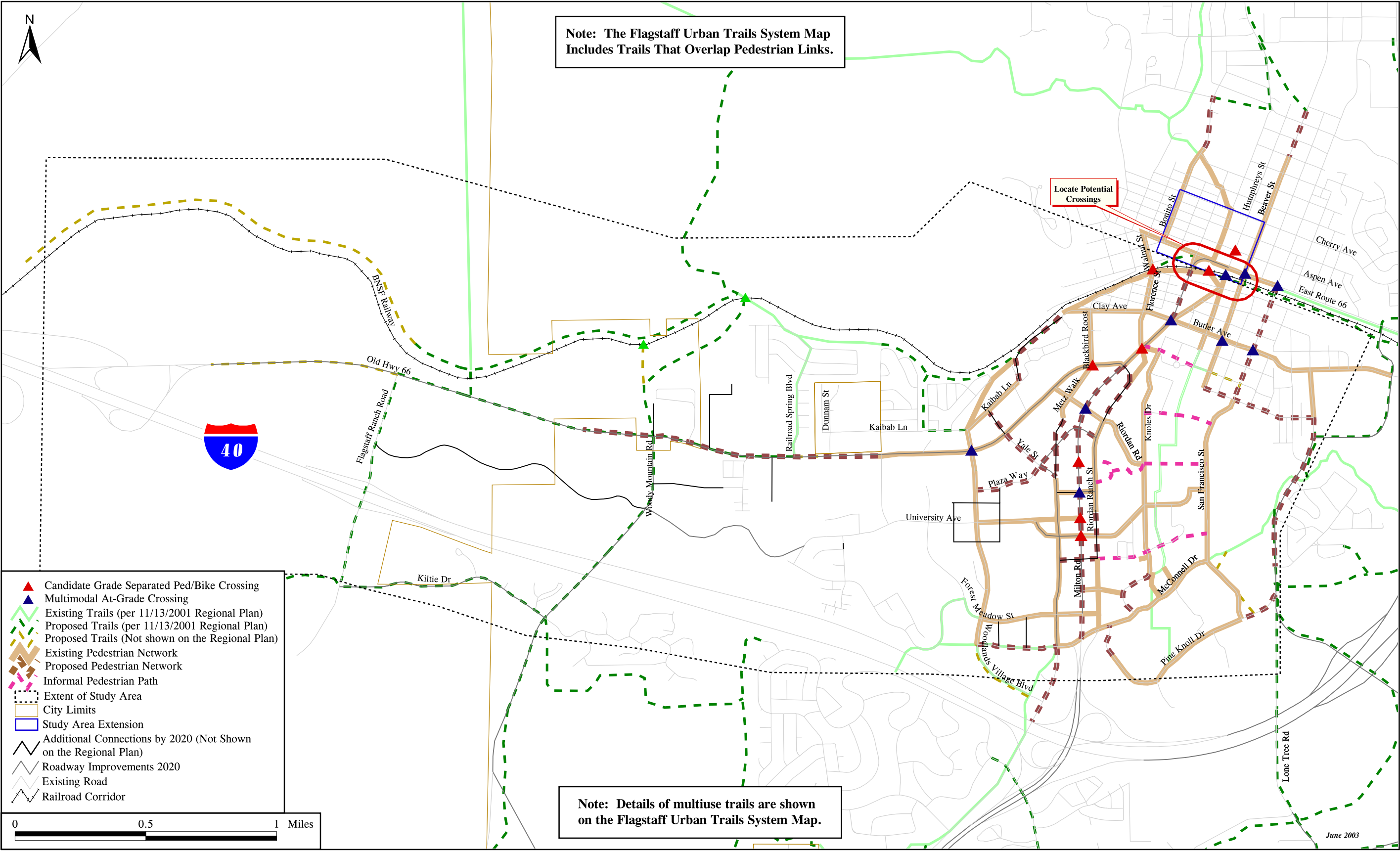
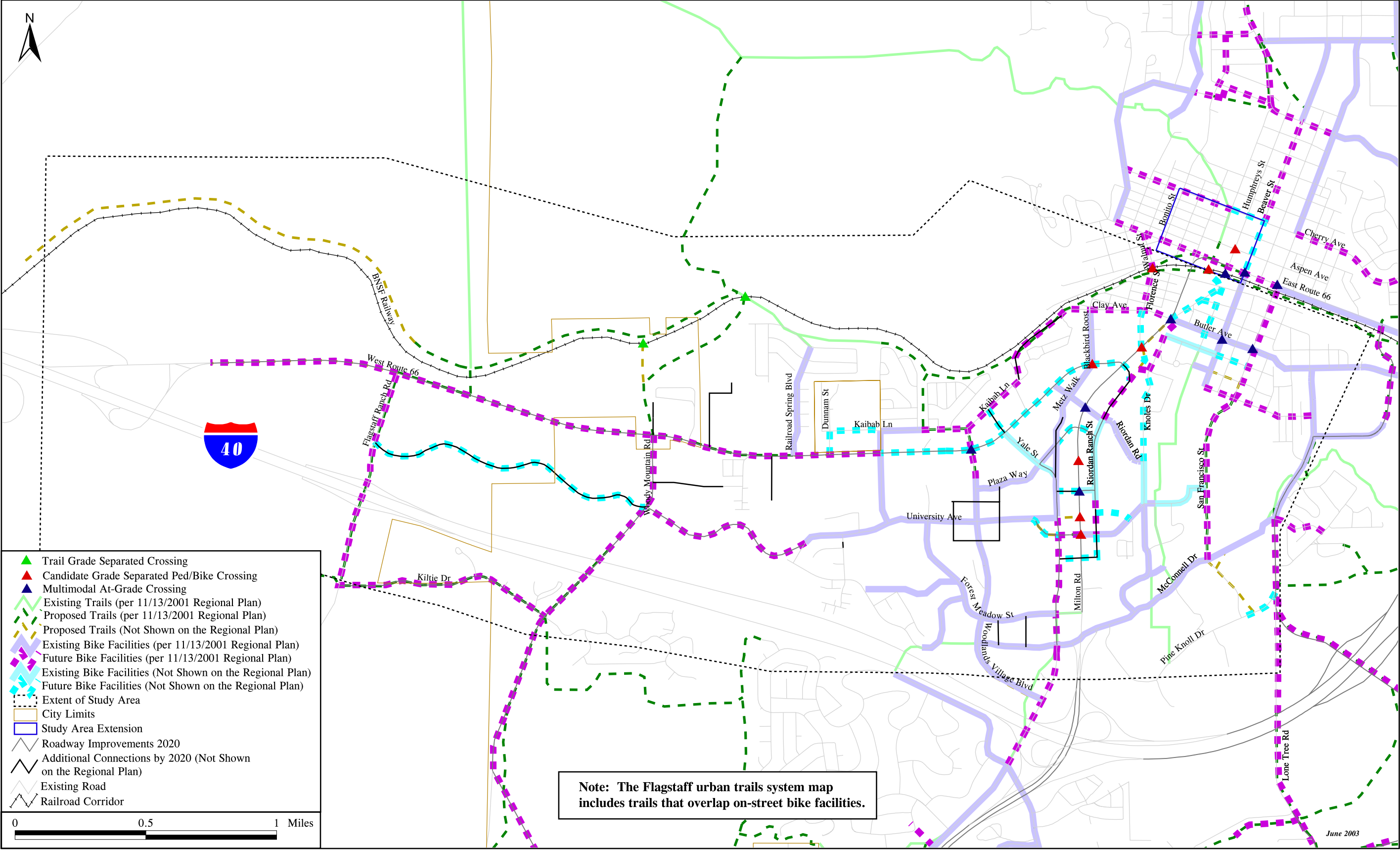


FIGURE 35. ON-STREET BIKE FACILITIES AND MULTIUSE TRAILS



8. IMPLEMENTATION



This chapter presents a recommended Transportation Improvement Program (TIP) for the study corridors and an array of strategies for implementing the transportation improvements. Details are also presented on how to implement four key elements of the recommendations: 1) increased access management, 2) wider ROW for street and sidewalk improvements, 3) extended local streets and roads to close network gaps, and 4) improved multimodal facilities and travel demand management.

TRANSPORTATION IMPROVEMENT PROGRAM

A comprehensive program of immediate actions, short-range projects, and long-range projects has been developed as a basis for implementing the FUMS recommendations.

Immediate Action Program

ADOT, FMPO, City of Flagstaff, and Coconino County should support the corridor recommendations to establish the foundation for implementing the recommendations.

The pending Rio de Flag Flood Control project crossing the area between the BNSF Railroad Bridge and Humphreys Street as well as the Downtown redevelopment of blocks along Humphreys Street makes it critical for agencies to coordinate on the recommendation to construct a dual left-turn lane at the East Route 66/Humphreys Street intersection and to widen portions of Humphreys Street. The roadway construction must be done at the same time as the other projects to take advantage of economies and minimize disruption of traffic. ADOT, FMPO, City of Flagstaff, and the Corps of Engineers should form an Action Team to achieve the following:

- Identify extent of improvements for BNSF to Humphreys Street.
- Identify extent of improvements for Humphreys Street.
- Identify and reserve right-of-way along East Route 66.
- Identify and reserve right-of-way along Humphreys from East Route 66 to Cherry Avenue.

- Design the roadway improvements in coordination with the Rio de Flag Flood Control project and Downtown redevelopment project.
- Coordinate the phasing of the construction of all three projects.
- Coordinate on construction of the multiuse trails and pedestrian overpass.
- Identify funding sources.

Short-Range Program

The short-range program is shown in Table 27. Projects for the short-range program are primarily for the downtown improvement options. These include constructing a dual left-turn lane at the East Route 66/Humphreys Street intersection, constructing a pedestrian grade-separated crossing across Humphreys Street between the City Hall Property on the west and the redeveloped property on the east. An opportunity exists to integrate the pedestrian/bicycle grade-separated crossing into the redeveloped property. The short-range program also includes upgrading and coordinating the traffic signal system in the corridors and design studies.

Long-Range Program

Table 28 presents the long-range program to construct improvements on Milton Road, backage roads, and West 66. In addition to those projects shown in Table 28, the transit, FUTS, pedestrian connections, and on-street bicycle facilities presented in the recommendations should be implemented.

NEXT STEPS - IMPLEMENTATION

A proposed work plan for implementing the recommendations is illustrated in Figure 36. The FUMS partners should initiate the work plan including setting up the institutional arrangements and preparing implementation guidelines. An implementation plan should then be developed that includes implementation strategies, schedule, responsibilities, funding and organizational agreements. A public involvement plan should also be developed as well as a program to monitor the implementation.

The following presents an initial set of implementation strategies and discusses how some of the key elements of the recommendations can be implemented. As the implementation work plan is initiated, the FUMS partners would refine the strategies and expand on the implementation strategies for the key elements.

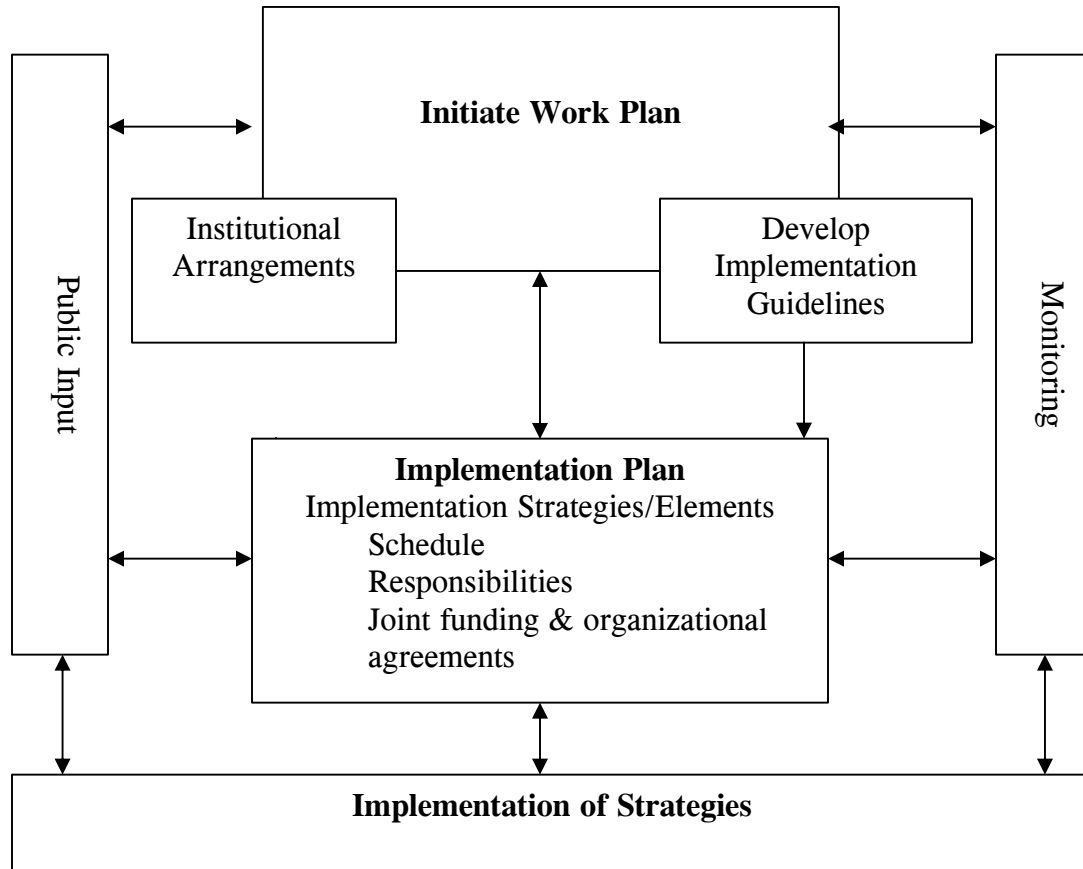
TABLE 27. SHORT-RANGE CORRIDOR IMPROVEMENT PROGRAM, 2004-2008

State Route	Location	Project Type	Responsibility	Schedule
Milton Road/East Route 66	Forest Meadows to Beaver Street	Coordinate and upgrade traffic signals	ADOT, FMPO	2007
West Route 66	Milton Road to Woody Mountain Road			
East Route 66	BNSF Railroad Bridge to Humphreys Street	Design and construct dual left-turn lane Acquire right-of-way acquisition	ADOT, City	2008
East Route 66	Humphreys Street, Beaver Street, San Francisco Street	Install multimodal at grade crossings (3)		
Humphreys Street	East Route 66 to Birch Avenue	Design and widen to : 2 lanes northbound	ADOT, City	2008
	Birch Avenue to Cherry Avenue	Transition from 2 lanes to one lane northbound		
	Aspen Avenue to East Rout 66	Widen to 2 lanes southbound from Aspen Avenue to East Route 66		
Humphreys Street	Across Humphreys Street Just North of East Route 66	Design and Construct pedestrian/bicycle grade-separated crossing	ADOT, City	2008
Studies				
West Route 66	East of Flagstaff Ranch Road	Design and Construct Gateway	City, County	2008
Milton Road	Just North of I-17 interchange	Design and Construct Gateway	City	2008
Milton Road/East Route 66	Forest Meadows to Beaver Street	Comprehensive Way Finding Study	ADOT, City	2006
West Route 66	Milton Road to I-140	Comprehensive Way Finding Study		2006
Milton Road/East Route 66	Relocation and widening of BNSF Bridge Widening of East Route 66	Design Concept Report	ADOT, BNSF	2006

TABLE 28. LONG-RANGE TRANSPORTATION IMPROVEMENT PROGRAM

Location	Project Type	Responsibility	Schedule
Milton Road			
I-17 to University Drive	Construct urban arterial with raised median	ADOT	2020
University Drive to Plaza Way	Construct urban arterial with raised median	ADOT	2020
Plaza Way to Riordan Road	Construct urban arterial with raised median	ADOT	2020
Riordan Road to West Route 66	Construct urban arterial with raised median	ADOT	2020
West Route 66 to Butler Avenue	Construct urban arterial with raised median	ADOT	2020
Butler Avenue to BNSF Railroad Bridge	Construct urban arterial with raised median	ADOT	2020
McConnel Drive to West Route 66	Construct backage road	City	2020
Chambers Drive	New traffic signal	ADOT	as warranted
Milton Road to Butler Avenue	Construct 4 pedestrian/Bicycle grade-separated crossings	ADOT, FMPO, City	2020
Milton Road to Butler Avenue	Install 3 multimodal at-grade crossings	ADOT, FMPO, City	2020
North of I-17	Construct gateway	City, County	2010
West Route 66			
Milton Rd to Blackbird Roost	Construct urban arterial with raised median	ADOT	2010
Blackbird Roost to Riordan Road	Construct urban arterial with raised medians and bike lanes	ADOT	2020
Riordan Road to Woodlands Village	Construct urban arterial with raised medians and bike lanes	ADOT	2020
Woodlands Village to Railroad Springs	Construct urban arterial with raised medians and bike lanes	ADOT	2020
Railroad Springs to Woody Mountain Road	Construct urban arterial with raised medians and bike lanes	ADOT	2020
Woody Mountain Road to Flagstaff Ranch Road	Reconstruct 2-lane rural arterial	ADOT	2020
Flagstaff Ranch Road to I-40 Interchange	Reconstruct 2-lane rural arterial	ADOT	2020
Clay Avenue to Dunnam Street	Construct backage road system along Kaibab Lane	City	2020
Blackbird Roost	Construct pedestrian/Bicycle grade separated crossing	ADOT, FMPO, City	2010
Woodlands Village Boulevard	Install 1 multimodal at-grade crossing	ADOT	2020
BlackBird Roost	Install traffic signal	ADOT	as warranted
Woody Mountain Road	Install traffic signal	ADOT	as warranted
East of Flagstaff Ranch Road	Construct gateway	City, County	2010
	Upgrade signals and coordinate corridor wide		
Other Improvements Off State System			
Butler Avenue	2 multimodal crossings	City	2010
Walnut Avenue	Construct pedestrian/ bicycle grade-separated crossing	City, Rio de Flag Project	2020
Rio de Flagstaff project across East Route 66	Construct pedestrian/ bicycle grade-separated crossing		

FIGURE 36. PROPOSED WORK PLAN



Implementation Strategies

An initial set of strategies for implementing the recommendations by the FUMS Partners is presented in Table 29. These strategies were identified based on the goals and policies presented in a previous chapter that were developed in coordination with the FUMS PAC. The following are selected key strategies that should be implemented as soon as possible:

- ADOT, FMPO, City of Flagstaff, and Coconino County should support the corridor recommendations to establish the foundation for implementation.
- The FUMS partners should establish a Corridor Management Team.
- The City of Flagstaff should identify and prioritize redevelopment districts within the corridors.
- The FUMS partners should establish a Transportation Demand Management Coordinator to coordinate alternative modes.

The FUMS Partners should identify and pursue funding sources for corridor improvements.

TABLE 29. IMPLEMENTATION STRATEGIES

Goal 1: System Integration
<p>To maintain and improve the safe and efficient movement of people and goods, to contribute to the health of Flagstaff's and Coconino County's local and regional economies, and to enhance livability as well as to support Arizona's statewide transportation system.</p>
<p>Strategy 1.1: Provide A Seamless Transportation System</p> <p>The <i>FUMS Partners</i> will create an increasingly seamless transportation system with respect to the development, operation, and maintenance of the highway and road system.</p>
<p>Strategy 1.2: Partnerships</p> <p>The <i>FUMS Partners</i> will foster the establishment of cooperative partnerships to make more efficient and effective use of the limited resources to develop, operate, and maintain the highway and street system. These partnerships are relationships among ADOT, FHWA, FTA, other state and federal agencies, FMPO, City of Flagstaff, Coconino County, NAU, tribal governments, and the private sector.</p>
<p>Strategy 1.3: Organizational Enhancements</p> <p>The <i>FUMS partners</i> will form a Corridor Management Team among existing stakeholders in taking on a more active role for corridor improvements to provide ongoing services, manage capital improvement projects, or raise funds to implement improvements.</p>
<p>Strategy 1.4: Intergovernmental Working Group</p> <p>The <i>FUMS partners</i> will form an Intergovernmental Working Group to resolve conflict, get agreement on the recommendations by elected officials, write joint funding policies, and implement Intergovernmental Agreements.</p>
<p>Strategy 1.5: Functional Highway Classification System</p> <p>The <i>FMPO</i> will apply and update the regional highway classification system to develop improvement guidelines and set priorities for system investment and management.</p>
<p>Strategy 1.6: Coordination, Consultation, and Cooperation</p> <p>In the spirit of coordination, consultation, and cooperation the <i>FUMS Partners</i> will work together to improve the mobility within the corridor.</p> <p>Additionally, the <i>FUMS Partners</i> will coordinate land use and transportation decisions to efficiently use public infrastructure investments.</p>
<p>Strategy 1.7: Interjurisdictional Transfers</p> <p>The <i>FUMS Partners</i> will consider mutually beneficial interjurisdictional transfers of facilities.</p>
Goal 2: System Investment
<p>Strategy 2.1: Improvement Funding and Priorities</p> <p><i>ADOT</i> will maintain highway performance and enhance safety by improving system efficiency and management before adding capacity to the State Highways. <i>ADOT</i> will work in partnership with regional and local governments to address highway performance and safety needs.</p>
<p>Strategy 2.2: Improve Corridor Performance</p> <p>The <i>FUMS Partners</i> will cooperatively work on improving traffic flow on the state routes as well as throughout the corridor.</p> <p>Additionally the <i>FUMS Partners</i> will use traffic control measures and maintenance to enhance the efficiency of the corridors.</p>

TABLE 29. IMPLEMENTATION STRATEGIES (Continued)

Strategy 2.3: Off-system Improvements

ADOT will consider assistance to local jurisdictions to develop, enhance, and maintain improvements of local transportation systems if they are a cost-effective way to improve the operation of the State Highway System. *ADOT* will support such projects through mechanisms such as enhancement grants if the project is mutually beneficial.

The *FUMS Partners* will work cooperatively to pursue traditional and innovative funding sources to fund the recommendations.

Goal 3: System Management

The *FUMS Partners* will continuously improve and support the efficient management of the transportation system to improve the functioning of the corridors in a cost-effective manner.

Strategy 3.1: Transportation Demand Management

The *FUMS Partners* will support the efficient use of the state and local transportation system through investment in transportation demand management. In addition, the *FUMS Partners* will establish a Transportation Demand Management coordinator to coordinate all the modes toward the goal of reducing vehicle trips and encouraging alternative modes.

Goal 4: Traffic Safety

The *FUMS Partners* will continuously improve safety for all users of the highway system using solutions involving engineering, education, enforcement, and emergency medical services.

Strategy 4.1: Improve Safety throughout the Corridor

The *FUMS Partners* will improve safety in the corridors and will make funding available for safety related projects.

Goal 5: Access Management

The *FUMS Partners* will employ access management to ensure safe and efficient streets and highways consistent with their determined function, ensure the statewide movement of goods and services, enhance community livability and support planned development patterns, while recognizing the needs of motor vehicles, transit, pedestrians, and bicyclists.

Strategy 5.1: Recognition of Property Rights

The *FUMS Partners* recognize that every owner of property, which abuts a State Highway, has the right to reasonable access but does not have the right of unregulated access.

Strategy 5.2: Implementation of Access Management

The *FUMS Partners* will cooperatively develop and implement a comprehensive access management plan to preserve and maintain the safety, capacity, and mobility of the State's Highway system and link the communities, businesses, and neighborhoods it serves.

Strategy 5.3: Develop and Implement Guidelines and Standards

The *FUMS Partners* will establish an access management team to cooperatively develop guidelines and standards, and to define and regulate access to the State Highway System. Additionally, *ADOT* will adequately support, and provide resources for, the permitting process and the enforcement of access management. The *FUMS* team took an initial step toward developing implementation guidelines and standards in the preparation of a *Draft Access Management Actions, Issues and Implementation*, February 3, 2003.

Strategy 5.4: Purchase Access Control

The *FUMS Partners* will cooperatively use the purchase of access rights, when feasible, to implement access management.

TABLE 29. IMPLEMENTATION STRATEGIES (Continued)

Strategy 5.5: Recognize the Interdependency of Land Use and Transportation for Access Management

The *FUMS Partners* recognize that land use and transportation are mutually dependent and that successful access management requires the linkage of land use and transportation decisions.

Strategy 5.6: Support Access Management Through Public Outreach

The *FUMS Partners* will cooperatively support the implementation of access management through outreach, public participation, and educational processes.

Strategy 5.7: Provide Funding for Access Management

The *FUMS Partners* will cooperatively strive to ensure that capital and operational funding is available for access management efforts.

Strategy 5.8. Implement Access Management through Land Use Regulation

The City will use zoning, special use permits, and the DRG to implement access management.

Goal 6: Travel Alternatives

To optimize the overall efficiency and utility of the State Highway System and the corridor street network through the use of alternative modes and multimodal travel demand management strategies.

Strategy 6.1: Highway Freight System

The *FUMS Partners* will balance the need for movement of goods with other uses of the highway system, and to recognize the importance of maintaining efficient through movement on major truck freight routes.

Strategy 6.2: Alternative Modes

The *FUMS Partners* will advance and support alternative transportation systems where travel demand, land use, and other factors indicate the potential for successful and effective development of alternative modes.

Strategy 6.3: Encourage Walking and Bicycling

The *FUMS Partners* will address pedestrian/bicycle issues through comprehensive planning and setting priorities for capital improvements.

Strategy 6.4: Provide Accessibility

The *FUMS Partners* will enhance intermodal access for persons with impaired mobility and adhere to the Americans with Disabilities Act and Environmental Justice considerations.

Goal 7: Acknowledge The Interrelationship Of Land Use And Transportation

To acknowledge the mutual dependency of land use and transportation in the decision-making process.

Strategy 7.1: Establish Land Use – Transportation Linkage

The *FUMS Partners* recognize that land use and transportation are mutually dependent and that successful management of the corridors requires the linkage of land use and transportation decisions.

Goal 8: Environmental And Scenic Resources

To protect and enhance the natural and built environment throughout the process of constructing, operating, and maintaining the State Highway System.

TABLE 29. IMPLEMENTATION STRATEGIES (Continued)

Strategy 8.1: Protect The Environment

The *FUMS Partners* will design, construct, operate, and maintain the State and local Highway System in consideration of the build and natural environment, especially wildlife habitat and migration routes, sensitive habitats and others.

Strategy 8.2: Scenic Resources

The *FUMS Partners* will implement scenic resource management as an integral part of the process of creating and maintaining the State and local Highway System. State and local agencies will use best management practices to protect and enhance scenic resources in all phases of highway project planning, development, construction, and maintenance.

Strategy 8.3: Historic Preservation

The *FUMS Partners* recognize the importance of historic preservation in the study corridor and will use best management practices to protect and enhance historic resources, including roadway features, in all phases of highway project planning, development, construction, and maintenance.

Strategy 8.4: Gateways

The *FUMS Partners* will provide aesthetic gateways into the City of Flagstaff that clearly define the character of the area, communicates a sense of place, and denotes the transition from the rural interstate highway to the urban environment.

Goal 9: Public Involvement

To continuously inform and involve the public in all phases of corridor project planning, development, construction, and maintenance.

Strategy 9.1: Public Participation

The *FUMS Partners* ensure that citizens, businesses, regional and local governments, state agencies, and tribal governments have opportunities to have input into decisions regarding proposed policies, plans, programs, and improvement projects that affect the State Highway System and corridor routes.

SPECIFIC STRATEGIES TO IMPLEMENT SELECTED KEY ELEMENTS OF THE RECOMMENDATIONS

This section elaborates on strategies to implement four selected key elements of the recommendations that have specific obstacles to overcome. These elements are: 1) increased access management, 2) wider ROW for street and sidewalk improvements, 3) extended local streets and roads to close network gaps, and 4) improved multimodal facilities and travel demand management. The discussion for each of the four elements covers the following: specific actions required, primary obstacles, discussion of implications, and strategies. As noted earlier, as the full implementation plan is developed strategies for other elements of the recommendations will be defined by the FUMS partners in a similar manner.

The following strategies are common to the four elements discussed below:

- ADOT, City of Flagstaff, and Coconino County should formally approve the corridor concept plan.

- The FUMS partners should document a defensible basis for a corridor plan, tied to public health, safety, welfare, etc. For example, the corridor plan offers significant improvements to circulation, mobility, and safety with general benefit to the community and specific benefit to abutting properties.
- The FUMS partners should implement a Corridor Development District, a special assessment district for the purpose of planning and funding desired corridor improvements. Such districts allow the imposition of special taxes in an area that would benefit from the transportation project. Special assessments are derived from development that will be generated as a result of the transportation facility. Revenue bonds are often issued to cover the improvement, backed by anticipated increases in tax revenue.

1. Implementation Element: Increased Access Management

Specific Actions Required:

- Reduce number of driveways.
- Introduce center median/divided roadway, reduce left-turn access to some of the remaining driveways.

Primary Obstacles:

- General land owner/business operator concern of losing business.
- Potential damage claims and suits against public agencies for loss of property value.
- Limited funding for implementing access management.

Discussion:

The ultimate implementation program will require the construction of raised medians, closure of driveways, construction of backage roads, cross-property access easements, and constructing new connecting streets (e.g., extension of Beulah Boulevard). The construction of these improvements would be disruptive to the properties adjacent to the state routes. Implementing the improvements as the properties redevelop may minimize impacts along the corridors. However, properties within the two study corridors may redevelop one at a time, in no particular pattern. Some properties might not redevelop for many years. Another issue is the subdivision of land in undeveloped portions of West Route 66 result in more access points along the Route. Hence, recommended improvements within the developed portions of the corridor, such as constructing medians and closing driveways will impact existing business unless the construction is accomplished in conjunction with redevelopment of the adjacent properties. The reconstruction of the roadways can only be achieved in conjunction with redevelopment districts.

Strategies:

- The *City* should identify and prioritize redevelopment districts within the corridors.
- *ADOT, City of Flagstaff, and Coconino County* should implement an intergovernmental agreement and access management system for these corridors. Driveway cuts must be approved by both affected entities, based on the corridor concept plan. ADOT's existing safety-based criteria would be expanded to include corridor management provisions emerging from the FUMS project.
- The *City and County* should impose driveway limitations and closures as properties redevelop. Specific language specifying future loss of left-turn access, if applicable, should be included in development agreements. All existing access permits expire at redevelopment and new access must be established through the process.
- The *City and County* should create exaction-based requirements for cost participation in medians and backage roads to be imposed at development approval, and collected at building permit. Create corridor revolving funds for these monies to be used as street improvement projects come forward. Treat revolving funds as impact fee systems with all monies fungible and not tied to originating parcel.
- The *City and County* should require cross-property access easements as part of the redevelopment process to allow local circulation between sites.
- The *City and County* should revise subdivision ordinances to require parcel access consistent with corridor plans.
- The *City and County* should create a City and County program to advance (loan) funds to ADOT to accelerate state projects and to solve specific issues holding up redevelopment. Also, mixing with revolving fund monies should be allowed.

2. Implementation Element: Wider ROW for Street and Sidewalk Improvements

Specific Actions Required:

- Acquire additional right-of-way, needed for wider cross-section.

Primary Obstacles:

- General land owner/business operator opposition.
- Potential damage claims and suits against public agencies for loss of property value.
- Lack of funding for outright acquisition of needed ROW by a public agency.
- Complexity of timing, given likely road funding schedule.

Discussion:

Long-standing case law supports exactions of rights of way needed for public streets. However, these decisions generally rest on the principal that properties need access to be developable in the first place. In this case, the street already exists, but must be resized, making the exaction potentially challengeable. Having a City Attorney look into Arizona-specific case law might be worthwhile. Exactions of needed right-of-way on the occasion of a request for redevelopment approval are probably supportable, but Arizona law or case law could have created a different situation than elsewhere. Nonetheless, ADOT is not in a position to impose exactions, so the responsibility to exact land would fall to the local jurisdiction.

A potential legal issue exists pertaining to timing. If the local jurisdiction serves advance notice formally that a given swath of ROW will be needed in the corridor, then that could reduce the legal liability. Obviously, the City and County should prevent new construction of buildings, and other permanent facilities and utilities, in the space needed for the street ROW. However, the issue may be further aggravated if land owners/developers, utilities, etc. do not discover the public ROW is needed until late in their planning processes. A case might also be made that the issue is clouded if sales of abutting property occur after the corridor plan is approved and before an attempt is made to acquire, exact, or otherwise secure the ROW for the street.

Finally, it seems likely that at least some of the ROW needed for street widening will require outright acquisition. This can be quite costly, and the cost escalates over time. Ironically, the cost escalates as roadway improvements are scheduled, funded and completed, adding value to abutting properties. Right-of-way costs often represent half or more of the total cost of urban street widening projects.

Strategies:

- The *City* should identify and prioritize redevelopment districts within the corridors.
- *ADOT, City of Flagstaff, and Coconino County* should develop a coordinated State/City/County process to file “maps of reservation” recording (at the courthouse) a prohibition against building within the mapped reservation area and notifying current and future land owners of an impending exaction. This used to be normal municipal business, accomplished through city “thoroughfare plans” but this has fallen out of common practice in recent decades. A potential legal liability can be created for reverse condemnation actions by affected property owners, and the history of this case law in Arizona should be researched. Generally, the three jurisdictions should be able to make maps of reservation process work without too much legal interference. In occasional instances, a forced acquisition of the property may result, leading to the need for the next strategy.
- The *City and County* should create City and County program(s) to advance (loan) funds to ADOT to buy contested parcels.

3. Implementation Element: Extend Local Streets and Roads to Close Network Gaps

Specific Actions Required:

- Acquire additional right-of-way needed for street extensions.
- Build street extensions.

Primary Obstacles:

- General land owner/business operator opposition.
- Potential general public opposition to new construction.
- High potential for need to exercise condemnation authority to back up land acquisition process.
- Lack of funding for outright acquisition of needed ROW and for road construction of extensions.
- Complexity of timing, given likely road funding schedule.

Discussion:

This element raises many of the same problems as element #2 above. It seems that a positive factor here is the clear evidence of a significant benefit in terms of congestion alleviation as well as improved access and circulation. This argument will be strongest at the corridor-wide level, which is one reason an approved corridor plan is so important. It would be fairly tempting for elected bodies to give a little here and there in the face of concerted opposition to the point that further actions yield much less benefit. The plan must stand as a whole even though it will likely be implemented in pieces over many years.

In all probability, most of the land required for these street extensions will have to be purchased by the City or County. Thus, many of the concerns about property cost escalation described in #2 above are relevant here, too.

Certain costs associated with building these extensions will fall in a gray area. These include intersection improvements and traffic signals. If these were undertaken as part of a state project in the arterial corridor, ADOT would probably fund them routinely. However, if City or County projects come forward first, the state may look to the local entity to fund these costs. This element clearly implies local funding being available for the extensions in some specific time frame, and should be established as part of the plan.

Strategies:

- The *City* should identify and prioritize redevelopment districts within the corridors.
- The *City of Flagstaff and Coconino County* should develop a coordinated City and

County process to file “maps of reservation” recording (at the courthouse) a prohibition against building within the mapped reservation area and notifying current and future land owners of an impending exaction or acquisition. A potential legal liability can be created for reverse condemnation actions by affected property owners, and the history of this case law in Arizona should be researched. Generally, the City and County should be able to make maps of reservation process work without too much legal interference. In occasional instances, a forced acquisition of the property may result, leading to the need for the next strategy.

- The *City and County* should create City and County program(s) to buy contested parcels.
- The *City and County* should address the funding required for these extensions and include the program of planned improvements in the corridor plan approval process.

4. Implementation Element: Improved Multimodal Facilities and Travel Demand Management

Specific Actions Required:

- Implement transit system
- Implement FUTS, on-street bicycle facilities, pedestrian connections
- Implement travel demand management actions such as carpooling, vanpooling, and staggered hours

Primary Obstacles:

- Current institutional arrangements
- Auto oriented land use
- Street system that is discontinuous
- Funding

Discussion:

The aggressive implementation of multimodal facilities and services is critical for moving toward the adopted RLTP goal of an 11 percent regionwide shift from the automobile mode to the alternative modes of transit, walking, and bicycling. The community has taken steps toward this goal by the passing sales tax to support transit and pedestrian facilities. Other positive steps toward supporting multimodal facilities included the adoption of the RLTP, FUTS, Design Review Guidelines, as well as the development of the bicycle system. The upgrade of the Mountain Line services and the recent audit of the transit system have advanced transit service in the region. However, to reach the goal of an 11 percent modal shift, much more needs to be achieved.

Strategies:

- ***ADOT, the City of Flagstaff, FMPO, Coconino County, and NAU*** should coordinate in designating an alternative mode coordinator to coordinate implementation of pedestrian, bicycle, transit facilities, and carpooling.
- The ***FMPO*** should conduct a periodic survey of residents and visitors on the level of use of all the modes of transportation.
- ***NAU*** should reduce student automobile use through parking fees and campus resident automobile restrictions.
- ***Mountain Line and NAU*** transit should integrate transit operations as a seamless transit system.
- The ***City of Flagstaff*** should aggressively encourage land use to redevelop as multi-use activities to encourage alternative modes.
- The FUMS partners should publish maps of transit, FUTS, pedestrian, and bicycle systems.

FUNDING

Funding for the corridor recommendations is currently severely limited due to the economic condition and state budget constraints. Therefore, the FUMS Partners must be aggressive in setting priorities; identifying traditional, innovative, and new funding sources; and pursuing funding opportunities. The following actions are recommended to pursue funding opportunities:

- **Position the recommended projects** to be highly competitive for funding by the following actions:
 - Support the recommendations of the corridor plan
 - Implement a Corridor Management Team
 - Prioritize projects
 - Identify and prioritize redevelopment districts
 - Implement a Corridor Development District
- **Identify and pursue existing funding sources** to ensure that all funding opportunities are captured. Identify categorical programs that can be used for specific recommendations such as the Hazard Elimination System (HERS).
- **Maximize leveraging available funds** to move up project timing and to match funds. Strategies could include loaning ADOT funds to advance projects in the 5-year Construction Program, using the Highway Extension-Expansion Loan Program (HELP) funds to advance project timing, and match state funds with local funds.

- **Place high priorities** on the recommended projects to get the projects into ADOT's scoping pool and then into the 5-year Construction program.
- **Capture opportunities** for integrating recommendations into other projects. The current downtown redevelopment is an excellent opportunity to reserve right-of-way, exact other improvements from the development such as the proposed grade-separated pedestrian/bicycle crossing, turn lanes, traffic signal improvements, and other improvements. Other public and private projects could provide right-of-way and improvements through developer exactions.
- **Establish a corridor district and fund** for implementing recommendations. The District would be funded by developer impact fees, sales tax generated in the corridor district, and other revenue sources.
- **Package recommended projects together** to conserve costs and maximize the benefits. For example, the recommended relocation of University Drive in the adopted RLTP could be packaged with the recommended pedestrian/bicycle grade-separated crossing and multimodal improvements on University Drive. The costs on the packaged improvements could be lower than if the projects were undertaken separately. Other projects such as a flood control project might provide opportunities to combine projects.
- **Pursue new funding sources** such as additional City sales tax revenue or a Regional Area Road Fund (RARF).
- **Track the SAFETEA legislation** to identify possible funding sources and changes in funding. SAFETEA is the reauthorization of the federal Transportation Equity Act for the 21st Century (TEA-21).

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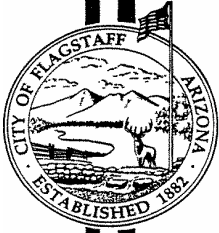
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APPENDIX
COMMENTS ON DRAFT FINAL REPORT FROM PROJECT
ADVISORY COMMITTEE MEMBERS



City of Flagstaff

OFFICE OF THE CITY MANAGER
(928) 779-7604

December 2, 2003

Mr. Jack Shambaugh, Project Manager
Arizona Department of Transportation
Transportation Planning Division
206 South 17th Avenue, Room 31DB
Phoenix, AZ 85007

RE: Flagstaff Urban Mobility Draft Final Report

Dear Mr. Shambaugh,

On behalf of the City of Flagstaff, thank you for the work you did on the Flagstaff Urban Mobility Study. The report is thorough and provides direction for redevelopment efforts and public projects in these corridors for many years. The case made by the consulting team for access management is compelling. The analysis clearly shows the safety and mobility benefits these types of improvements offer. The solutions arrived at for alternate modes of travel are in keeping with the community's oft-stated preferences. Beyond even this, I am pleased with how well the study conforms to the Flagstaff Regional Land Use and Transportation Plan. The policies in the Plan are the result of years of work and input from thousands of regional residents. Likewise, the Urban Mobility Study respects the significant input your team solicited from the public. As City Manager, I support the large majority of the study recommendations.

I must reference the concerns previously registered by the City Planning Director and the Flagstaff Metropolitan Planning Organization Transportation Planner. Clearly, the recommendation for dual left turns from E. Route 66 to Humphreys Street is controversial. Several community values must be balanced: safety; mobility – for drivers and pedestrians; economic development; urban design; and aesthetics. As I stated at the focus group earlier this year, I cannot allow uncertainty about future street configuration to delay redevelopment efforts in the downtown or the Rio de Flag flood control project. I would like to propose that City and ADOT staff collaborate on a concept design effort aimed at balancing the many needs served by this intersection. I will ask Dave Wessel to coordinate an initial meeting to discuss a joint study after I hear from you.

dwilcox@ci.flagstaff.az.us
Arizona Relay Service 7-1-1

211 West Aspen Avenue, Flagstaff, Arizona 86001
Main & TDD (928) 774-5281 • Fax (928) 779-7696

The recommendation to cul-de-sac Mike's Pike similarly places traffic movement against economic development. A study of the Southside will commence soon. Access into this community has been important to its residents and proprietors for some time. As part of the study staff will further investigate present and future demand for the right turn lane that appears to be the impetus in the report for closing Mike's Pike. I will also ask them to examine design options that might permit both the right turn lane and improved access via Mike's Pike.

Again, outside these two recommendations for which I believe compromise solutions may be found, I find the study addresses the needs facing our community. Would it be possible to move ahead with adoption of the plan, incorporating language that indicates an initial recommendation (the one contained in the draft) yet stipulates to further more detailed design studies?

I continue to appreciate the partnership we enjoy with ADOT. The Urban Mobility Study demonstrates that local and state transportation issues must be addressed as a collaborative effort.

Sincerely,

DAVID W. WILCOX
City Manager

cc: Jim Wine
Steve Lere
John Sliva
Ron Spinar
David Wessel

dwilcox@ci.flagstaff.az.us
Arizona Relay Service 7-1-1

From: John Sliva [<mailto:jsliva@ci.flagstaff.az.us>]
Sent: Tuesday, November 04, 2003 8:37 PM
To: JShambaugh@dot.state.az.us
Cc: Michael Kerski; Ron Spinar; Steve Lere
Subject: comments regarding Urban Mobility Study

As a member of the Technical Advisory Committee(TAC) of the Flagstaff Urban Mobility Study, I offer the following comments relative to the recommendations contained in the "final" draft. It is my understanding that these comments are to be incorporated in the Appendix of that report.

In submitting these comments, first of all I must give credit to the entire effort, the TAC, the consulting team, and all those individuals who made the effort to participate. Overall, I think the study is a success and will be helpful in arriving at good decisions in the future.

The comments that follow focus on the elements of the study that from their inception I have consistently questioned and registered concerns at all public TAC meetings. Specifically these concerns are entirely directed at the problem definition, solutions offered, and measurable benefit/cost associated with the recommendations in the Downtown and Southside Historic Districts. In particular I want to again register my objections to those recommendations concerning(1)dual left turn lanes and the widening of Humphrey's street with separated grade pedestrian crossing at Aspen; and (2)the cul-de-sac of Mike's Pike.

This is not an attempt to reanalyze the technical results outlined in the study that attempt, and in my opinion fail, to justify these "improvements". Rather this is more of a commentary and reaction on how we still tend to define "problems" in specialist terms, and thus fail in our attempts to generate realistic or effective solutions that consider all the issues in a holistic context.

In the course of the last three years the city has outlined a strategy, via a very public process(see the Field-Paoli report), for redeveloping four key blocks along Humphreys north of Route 66. Flagstaff is blessed with a largely intact historic core north and south of the railroad characterized by a small block pattern and grid of narrow streets all platted and developed prior to the advent of the automobile. The economy of the downtown area(and consequently the highest land values in the city) is largely driven by its' historic character, architecture and scale, and the pedestrian friendly nature of the district, and of which the city and private owners have invested millions of dollars in recent years to restore and maintain. In short pedestrians are what make downtowns work, not moving cars rapidly through pedestrian districts.

The projects outlined by the city and Requests for Proposals about to be released are designed to anchor the west end of downtown with a mixed use development including a 700- car parking structure, civic courts, federal office space, and miscellaneous retail. Along Humphreys street is a proposed 25 foot- wide tree-canopied pedestrian promenade designed to activate Humphreys Street and face off the 4th side of an expanded Wheeler Park. Integral to this concept is a new pedestrian crosswalk from Humphreys across Route 66 that directly connects physically and visually with the redeveloping Warehouse district and points beyond in the Southside via a new pedestrian undercrossing of the Railroad as a result of the Rio de Flag project. Altogether the project will provide the critical mass and economic and visual anchor to the west end of downtown, and on blocks largely devoid of historic buildings. This lack of historic buildings will allow maximum use of the small footprint of each block, which is a critical factor in successfully fitting buildings and parking structures together. Unfortunately, the traffic solutions offered in the Urban Mobility Study do just the opposite, i.e., Wheeler Park will be reduced, not expanded, The 4th side of the Square will front 4- 5 lanes of traffic instead of two and will further separate the pedestrian and park users from the downtown area(unless of course you mount and dismount the pedestrian overpass recommended in the study) , the Humphreys pedestrian walkway will be a through traffic lane, and the blocks will need to be reduced accordingly to make room for the road widening which will then make the block footprints completely inefficient for 4- sided entry architecture and essential onsite structured parking. And after that happens, someone will undoubtedly suggest that we widen Humphreys all the way to Columbus, because the only observable result of this proposal is that it just moved the "problem" around the corner to Aspen, Birch, and Cherry, and the city just lost another critical piece of its downtown real estate.

If one looks at the claims made in the study as to why we need to do this, one will see those familiar and conventional statements that report out that in 10-20 years from now we will maintain the congestion level at level "E" as opposed to "F", or that drivers will experience one second decrease their travel time at "peak hour" or there probably will be less rear-end collisions on Humphreys, at least until inevitably more traffic finds its way to this part of town and the improvement erodes to its' former problem condition. And then what? Perhaps we ought to rethink "peak hour" and make it relative to Flagstaff? How about "peak fifteen minutes"?

Cul de Sac(king) MiKe's Pike completely blocks off the historic Route 66 access that the access-poor Historic Southside has and hopes to enhance in it's promising future. Plans are underway to redevelop and restore this to it's former Route 66 glory and as a highly visual gateway to the Southside. In my opinion it makes no sense to close it or move it, it's far too valuable an asset for the Southside and its' future.

In summary, pursuing "supply side " traffic solutions for "problems" in historic core pedestrian areas has a darkly- checkered past, and reminds me once again that often the cure is far more worse than the disease. Its' like looseneing your belt for a weight problem.

Having said that leaves me with some obligation to propose something positive as an alternative to whining. Besides having great expectations that altering one's travel behaviour to avoid such bottlenecks in the peak fifteen minutes could work well in Flagstaff, I'll also say that congestion downtown is a good problem, especially if you own a business or collect taxes. But for those who insist on a physical roadbuilding solution, then look no further than at the results of the study that are truly significant, and at the single most significant solution identified which is the Lone Tree Road Route 66 intersection that bridges the railroad. Thank you for reading this, Sincerely John P. Sliva, Planning Director, City of Flagstaff

From: Dale Wegner [mailto:dwegner@co.coconino.az.us]

Sent: Tuesday, November 04, 2003 3:46 PM

To: jshambaugh@dot.state.az.us

Cc: David Wessel

Subject: Urban Mobility Study.

Here are the comments from Coconino County for the Urban Mobility Study:

Page i - page 80 should be page 85

Page iii - 14 & 15 should be page 80, 16 & 17 should be page 81, 18 should be page 82

Page iv - 19 should be page 82, 20 should be page 84, 21 should be page 85, Number 27 states 2004-2006, should 2006 be 2008 as in the table.

Page 9 first paragraph should say walking distances

There are many other typo's that need to be fixed that I will not go any future with but we could furnish you with our marked up copy.

We question the ability to get the mode shift that is listed in the report. The growth rate will keep up with this shift and most likely exceed it.

We agree with the recommendation to add dual lefts at Humphrey's as this was studied with many options and seemed to work the best.

Dale Wegner



Flagstaff Metropolitan Planning Organization

City of Flagstaff Coconino County Arizona Department of Transportation

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(928) 779-7685 ♦ FAX (928) 779-7693

November 4, 2003

Mr. Jack Shambaugh, Project Manager
Arizona Department of Transportation
Transportation Planning Division
206 South 17th Avenue, Room 310B
Phoenix, AZ 85007

RE: Flagstaff Urban Mobility Draft Final Report

Dear Jack,

Following are my comments on the Urban Mobility Study. I start with substantive comments and important errors and omissions and conclude with typographical errors. Thank you for this opportunity to comment and for your tireless hard work on this project.

Sincerely,

David Wessel, AICP
FMPO Transportation Planner

Substantive Comments and Corrections

Page 27 – Policy 3.1, second bullet. Add...”through *feasibility analysis*, development and use of park-and-ride facilities.” This is an idea that has been suggested but not researched.

Page 89 and 90 – Social/Political Acceptance. No parking is currently permitted on Humphreys Street. Beaver is already a one-way street, changing parking patterns should not be required. To the contrary, parking could be added to Humphreys.

Page 90 – Vehicular Operations. Strike the first comment. The left turn at Sitgreaves will be removed, so the improvement to left turns there cannot be achieved. Add comment regarding the back-up of westbound Aspen Avenue traffic on Humphreys Street.

Page 101 - 1st full paragraph. The second half of the second sentence conflicts with the first sentence.

Page 103 – 1st bullet. I urge that this recommendation be expanded to include relocation of the Mike’s Pike access north and/or improvements to access to Phoenix Avenue. Both improvements will require additional right-of-way. Given the study recommendations for a westbound right turn lane from Butler Avenue to Milton Road it is clear to me that the recommendation to close the current Mike’s Pike access is necessary.

Page 107 – Roadway Improvements, first bullet – Given the sensitivity of the downtown pedestrian environment and the difficulty of connecting a pedestrian overpass to the street-level system, I encourage that this second sentence be added to this recommendation: “The Humphreys Street improvements should provide street level improvements and signal phasing that mitigate to the greatest extent feasible negative impacts on pedestrian movements and the pedestrian environment.”

Typographical Errors

Acknowledgement – 1st paragraph, Organizations = Organization

Project Advisory Committee – Identify Mittelstedt as retired; Wessel is not with City of Flagstaff

Search Conference – Magnum = Mangum; Only one Maurer; Only one Wegner

Open House – strike Jeff Tcuker (listed again as Jeff Tucker)

lii – number 11. DRIVEWY

V - #11 LA ND

Page 1, para 1, citizen’s = citizens’

3 – last para, San Francisco = Santa Fe

4 – 2nd para, add University to Northern Arizona

10 – top page, add bullet on US 180?

10 – Transit, first bullet, strike “in”

24 – Corridor Principles, last bullet add “of” the corridor

25 – Policy 1.2 capitalize County

27 – Policy 2.3, third bullet, my = may

28 – Policy 4.1, third bullet, strike “walk”

50 – Last paragraph. Comments regarding cars queuing into eastbound Route 66 refer to the “outside lane.” Should this be the “inside” lane?

51 – top of page, second sentence, change to read “A northbound left-turn movement at East Route 66/Sitgreaves immediately west of the East Route 66/Humphreys intersection compounds the traffic operations with Humphreys Street northbound left-turn queue.”

62 – Multimodal Facilities, fourth bullet, change to read “for all the modes”

63 – first para, correct Humphreys

65 – next to last para, strike “following”

66 – top of table, correct Humphreys

67 – Summary – end of first para, occur = occurs

69 – 2020 base, third bullet, conditions actual degrade in the eastbound condition, shouldn’t this be stated?

70 – first bullet, insert “federal” ahead of Section 4f

72 – Screenline Analysis, change Tank Farms to Lone Tree

79 – Crash Analysis, first para, fix Butler

85 – first para, fix Humphreys

- 93 – second para, add “a” after “Group meetings and...”
- 94 – Community Character – missing last bullet symbol
- 101 – first para, add 66 and fix Humphreys
- 103 – first bullet, tatic =tactic
- 103 – Parallel Backage Roads, fourth bullet – Avenue = Boulevard
- 119 – next to last para, capitalize street two times
- 125 – Strategy 2.3, innovated = innovative

From: John Harper
Sent: Friday, November 14, 2003 5:15 PM
To: Jack Shambaugh
Cc: Chuck Gillick
Subject: FW: Final report FUMS

Jack -

The Flagstaff District supports the findings and conclusions of this study. We have no further comments or edits to the study.

Thank you for your commitment and assistance throughout this process. You have been an excellent facilitator and project manager.

John

From: Chuck Gillick
Sent: Friday, November 14, 2003 2:34 PM
To: John Harper
Subject: RE: Final report FUMS

I am in support of this study.